

Type 8222 ELEMENT

Conductivity meter
Leitfähigkeits-Messgerät
Conductivimètre



Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous réserve de modifications techniques.

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Operating Instructions 2106/6_EU-ML 00560330 / Original_FR

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1 ABOUT THE OPERATING INSTRUCTIONS

The Operating Instructions describe the entire lifecycle of the device. Please keep the Operating Instructions in a safe place, accessible to all users and any new owners.

The Operating Instructions contains important safety information.

Failure to comply with these instructions can lead to hazardous situations.

- ▶ Irrespective of the device variant, read the Operating Instructions. If you do not understand the content of the Operating Instructions then contact Bürkert.

1.1 Definition of the word “device”

The word “device” used within these Operating Instructions refers to the Type 8222 ELEMENT conductivity meter.

1.2 Validity of the Operating Instructions

The Operating Instructions are valid for the Type 8222 ELEMENT conductivity meter, version V2.

Mention V2 is given on the device Type-label. Refer to chpt. [5.4](#).

1.3 Symbols used



DANGER

Warns you against an imminent danger.

- ▶ Failure to observe this warning can result in death or in serious injury.



WARNING

Warns you against a potentially dangerous situation.

- ▶ Failure to observe this warning can result in serious injury or even death.



CAUTION

Warns you against a possible risk.

- ▶ Failure to observe this warning can result in substantial or minor injuries.

NOTICE

Warns against material damage.



Advice or important recommendations.



Refers to information contained in the Operating Instructions or in other documents.

- ▶ Indicates an instruction for risk prevention.
- Indicates a work step that you must carry out.
- ✔ Indicates a result.

2 INTENDED USE

Use of the device that does not comply with the instructions could present risks to people, nearby installations and the environment.

The Type 8222 ELEMENT conductivity meter is intended for the measurement of the conductivity in liquids

- ▶ Use the device in compliance with the characteristics and start-up and use conditions specified in the contractual documents and in the Operating Instructions.
- ▶ Do not use the device for security applications.
- ▶ Only operate a device in perfect working order.
- ▶ Store, transport, install and operate the device properly.
- ▶ Only use the device as intended.

3 BASIC SAFETY INFORMATION

This safety information does not take into account any contingencies or occurrences that may arise during installation, use and maintenance of the device.

The operating company is responsible for the respect of the local safety regulations including staff safety.



Risk of injury due to electrical voltage.

- ▶ Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- ▶ If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- ▶ All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- ▶ Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to pressure in the installation.

- ▶ Before any intervention in the installation, stop the circulation of fluid, cut off the pressure and drain the pipe.
- ▶ Before any intervention in the installation, make sure that there is no pressure in the pipe.
- ▶ Observe the dependency between the fluid temperature and the fluid pressure.



Risk of burns due to high fluid temperatures.

- ▶ Use safety gloves to handle the device.
- ▶ Before opening the pipe, stop the circulation of fluid and drain the pipe.
- ▶ Before opening the pipe, make sure that the pipe is completely empty.

Risk of injury due to the nature of the fluid.

- ▶ Respect the prevailing regulations on accident prevention and safety relating to the use of dangerous fluids.



Various dangerous situations.

To avoid injury, observe the following instructions:

- ▶ Do not use the device in explosive atmospheres.
- ▶ Do not use the device in an environment incompatible with the device materials.
- ▶ Do not use fluid that is incompatible with the device materials. Find the compatibility chart on our homepage: country.burkert.com
- ▶ Do not subject the device to mechanical stress.
- ▶ Do not make any modifications to the device.
- ▶ Prevent any unintentional power supply switch-on
- ▶ Only qualified and skilled staff may carry out the installation and maintenance work.
- ▶ Ensure a defined or controlled restart of the process after a power supply interruption.
- ▶ Observe the general technical rules.

NOTICE

Elements and components that are both sensitive to electrostatic discharges

The device contains electronic components that are sensitive to electrostatic discharges. The components may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, the components are instantly destroyed or disabled as soon as they are activated.

- ▶ To minimise or even avoid any damage caused by an electrostatic discharge, take all the precautions that are described in the EN 61340-5-1 norm.
- ▶ Do not touch any of the live electrical components.

4 GENERAL INFORMATION

4.1 Contact

To contact the manufacturer of the device, use following address:

Bürkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

The addresses of our international sales offices are available on the internet at: country.burkert.com

4.2 Warranty conditions

The condition governing the legal warranty is the conforming use of the device in observance of the operating conditions specified in the Operating Instructions.

4.3 Information on the internet

You can find the Operating Instructions and technical data sheets for Type 8222 at: country.burkert.com

5 DESCRIPTION

5.1 Area of application

The Type 8222 ELEMENT conductivity meter is intended for the measurement of the conductivity.

Thanks to two fully adjustable transistor outputs, the device can be used to switch a solenoid valve, activate an alarm and, thanks to one or two 4...20 mA current outputs, establish one or two control loops.

5.2 Construction of the 8222

The device comprises:

- A sensor for measuring physical parameters, comprising:
 - 2 electrodes which measure an impedance in Ohm
 - a Pt1000 temperature probe measuring a resistance.
- An acquisition / conversion module for the process values measured:
 - acquisition of the impedance measured in Ohm
 - conversion of the measured impedance into conductivity units
 - acquisition of the resistance measured and conversion into temperature
- An electrical housing which can include a display module. The display module has a navigation button used to read and/or configure the parameters of the device. The display module is available as an accessory (see chpt. 11).

One device variant of the device with 2 transistor outputs and a 4...20 mA output operates on a 2-wire system and requires a power supply of 14...36 V DC. For such a device variant, electrical connection is done via an M12, 5-point, male fixed connector.

One device variant of the device with 2 transistor outputs and two 4...20 mA outputs operates on a 3-wire system and requires a power supply of 12...36 V DC. For such a device variant, electrical connection is done via an M12, 5-point, male fixed connector and an M12, 5-point, female fixed connector.

5.3 Conductivity sensor

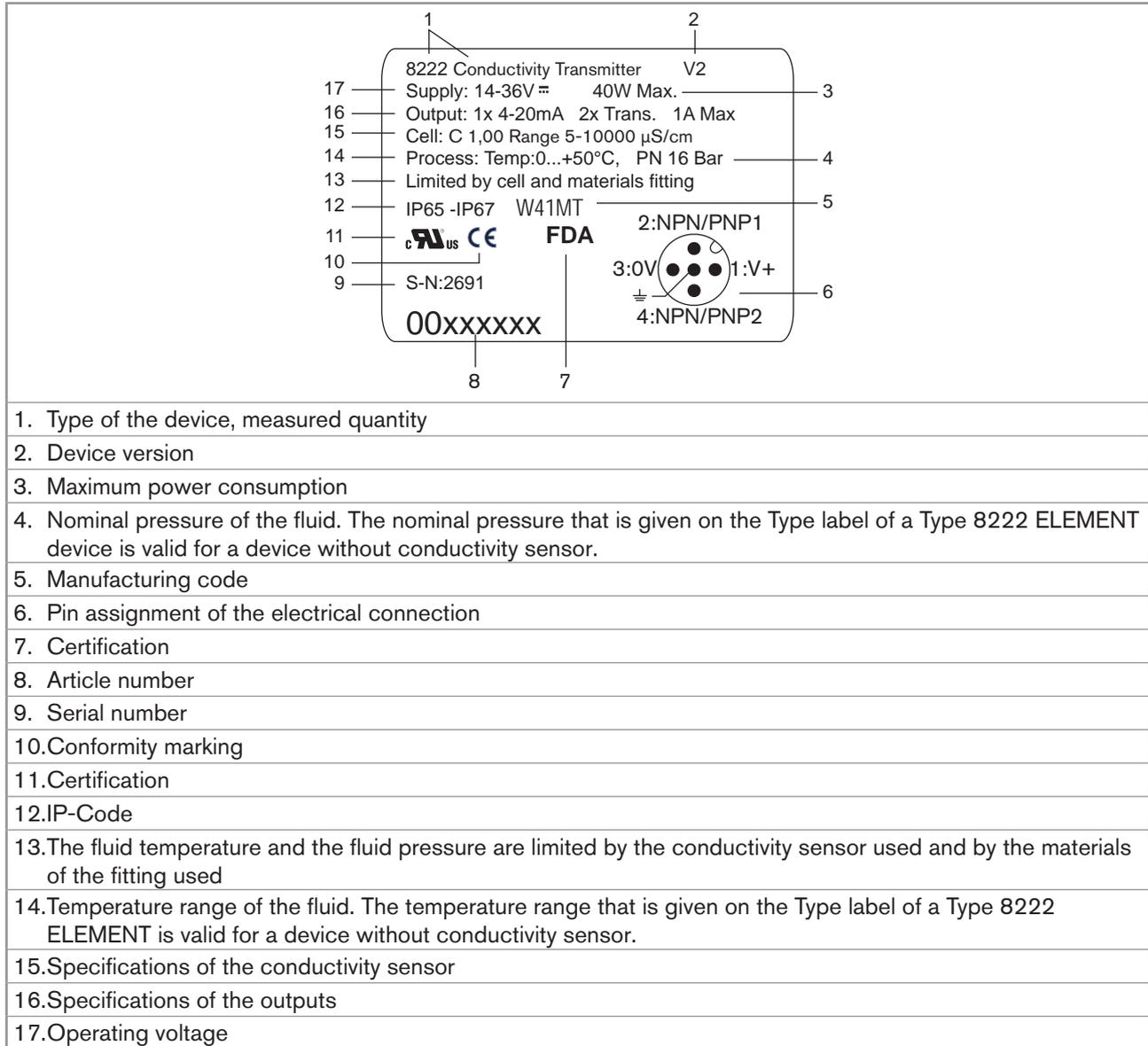
The device is fitted with a sensor measuring the conductivity. The sensor is pinned together with the electronic module and cannot be dismantled.

The sensor itself comprises a Pt1000 temperature probe and 2 electrodes (in stainless steel for sensors with a C constant of 0.01 or 0.1, in graphite for sensors with a C constant of 1.0).

The conductivity of a fluid is the capacity of this fluid to conduct electrical current thanks to the ions in the fluid.

An alternating voltage is applied to the electrode terminals: the current measured is directly proportional to the conductivity of the solution.

5.4 Type label



1.	Type of the device, measured quantity
2.	Device version
3.	Maximum power consumption
4.	Nominal pressure of the fluid. The nominal pressure that is given on the Type label of a Type 8222 ELEMENT device is valid for a device without conductivity sensor.
5.	Manufacturing code
6.	Pin assignment of the electrical connection
7.	Certification
8.	Article number
9.	Serial number
10.	Conformity marking
11.	Certification
12.	IP-Code
13.	The fluid temperature and the fluid pressure are limited by the conductivity sensor used and by the materials of the fitting used
14.	Temperature range of the fluid. The temperature range that is given on the Type label of a Type 8222 ELEMENT is valid for a device without conductivity sensor.
15.	Specifications of the conductivity sensor
16.	Specifications of the outputs
17.	Operating voltage

Fig. 1 : Type label (example)

6 TECHNICAL DATA

6.1 Conditions of use

Ambient temperature	-10...+60 °C
Air humidity	< 85%, without condensation
Use	Indoor and outdoor ▶ Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.
IP-Code	IP67 ¹⁾ and IP65 ¹⁾ according to IEC / EN 60529 Mating connectors must be wired, plugged, and tightened. Housing lid must be fully tightened and locked
<small>¹⁾ not evaluated by UL</small>	
Operating condition	Continuous operation
Equipment mobility	Fixed device
Degree of pollution	Degree 2 according to UL/EN 61010 -1
Installation category	Category I according to UL/EN 61010-1
Maximum height above sea level	2000 m

6.2 Conformity to standards and directives

The applied standards, which verify conformity with the EU directives, can be found on the EU-type examination certificate and/or the EU declaration of conformity (if applicable).

6.2.1 Conformity to the Pressure Equipment Directive

- ▶ Make sure that the device materials are compatible with the fluid.
- ▶ Make sure that the pipe DN is adapted for the device.
- ▶ Observe the fluid nominal pressure (PN) for the device. The nominal pressure (PN) is given by the device manufacturer.

The device conforms to Article 4, Paragraph 1 of the Pressure Equipment Directive 2014/68/EU under the following conditions:

- Device used on a piping (PS = maximum admissible pressure; DN = nominal diameter of the pipe)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.c.i	DN ≤ 25
Fluid group 2, Article 4, Paragraph 1.c.i	DN ≤ 32 or PSxDN ≤ 1000 bar
Fluid group 1, Article 4, Paragraph 1.c.ii	DN ≤ 25 or PSxDN ≤ 2000 bar
Fluid group 2, Article 4, Paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 bar or PSxDN ≤ 5000 bar

- Device used on a vessel (PS = maximum admissible pressure)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.a.i	PS ≤ 200 bar
Fluid group 2, Article 4, Paragraph 1.a.i	PS ≤ 1000 bar
Fluid group 1, Article 4, Paragraph 1.a.ii	PS ≤ 500 bar
Fluid group 2, Article 4, Paragraph 1.a.ii	PS ≤ 1000 bar

6.2.2 UL certification

The devices with variable key PU01 or PU02 are UL certified devices and comply also with the following standards:

- UL 61010-1
- CAN/CSA-C22.2 n°61010-1

Identification on the device	Certification	Variable key
	UL recognized	PU01
 Measuring Equipment EXXXXXX	UL listed	PU02

6.3 Dimensions of the device

→ Please refer to the technical data sheets related to the device available at: country.burkert.com

6.4 Mechanical data

	Part	Material
	Housing	stainless steel 316L 1.4404, PPS
	Housing seals	EPDM
	Housing lid	PC
	Housing-lid seal	silicone
	Display module	PC, PBT
	M12 male connector, M12 female connector	<ul style="list-style-type: none"> ▪ nickel-plated brass ▪ stainless steel, on request
	Support plate of the M12 male connector or M12 female connector	PPS CF30
	Screws	stainless steel
	Nut	PVC or PVDF
	Type 8222, parts in contact with the fluid	
	<ul style="list-style-type: none"> ▪ Conductivity sensor ▪ Pt1000 	<ul style="list-style-type: none"> ▪ PVDF ▪ stainless steel 1.4571 (316Ti)
	<ul style="list-style-type: none"> ▪ Electrodes of a sensor with C=1 ▪ Electrodes of a sensor with C=0.1 or C=0.01 	<ul style="list-style-type: none"> ▪ graphite ▪ stainless steel 1.4571 (316Ti)

Fig. 2 : Materials of the device

6.5 Fluid data

Pipe diameter	DN25 to DN110 (DN15 to DN20 under specific conditions)
Type of fitting	Type S022
Nut between the 8222 and the fitting	G 1 1/2" internal thread
Fluid temperature	The fluid temperature may be restricted by the fluid pressure, the material of the nut and the material of the fitting used.
▪ with a PVDF nut (see Fig. 3 and Fig. 5)	▪ -20...+100 °C
▪ with a PVC nut (Fig. 3 and Fig. 4)	▪ 0...+50 °C
Fluid pressure	PN16 ²⁾
²⁾ not evaluated by UL	The fluid pressure may be restricted by the fluid temperature, the material of the nut and the material of the fitting used. Refer to Fig. 3, Fig. 4 and Fig. 5.
Conductivity measurement	
▪ Measurement range	▪ 0,05 µS/cm...10 mS/cm
▪ Resolution	▪ 1 nS/cm
▪ Measurement deviation	▪ ±3 % of the measured value
▪ Recommended min. divergence of the conductivity range associated to the 4...20 mA signal	▪ 2 % of the full scale (e.g. for the sensor with C=0.1: range from 100...104 µS corresponds to the 4...20 mA output current)
Temperature probe	Pt1000 integrated in the conductivity sensor
Temperature measurement	
▪ Measurement range	▪ -40...+130 °C
▪ Resolution	▪ 0.1 °C
▪ Measurement deviation	▪ ±1 °C
▪ Recommended min. divergence of the temperature range associated to the 4...20 mA signal	▪ 10 °C (e.g. range +10...+20 °C corresponds to the 4...20 mA output current)
Temperature compensation	<ul style="list-style-type: none"> ▪ no compensation ▪ compensation according to a predefined curve: NaCl or ultra pure water ▪ compensation according to a curve defined especially for your process

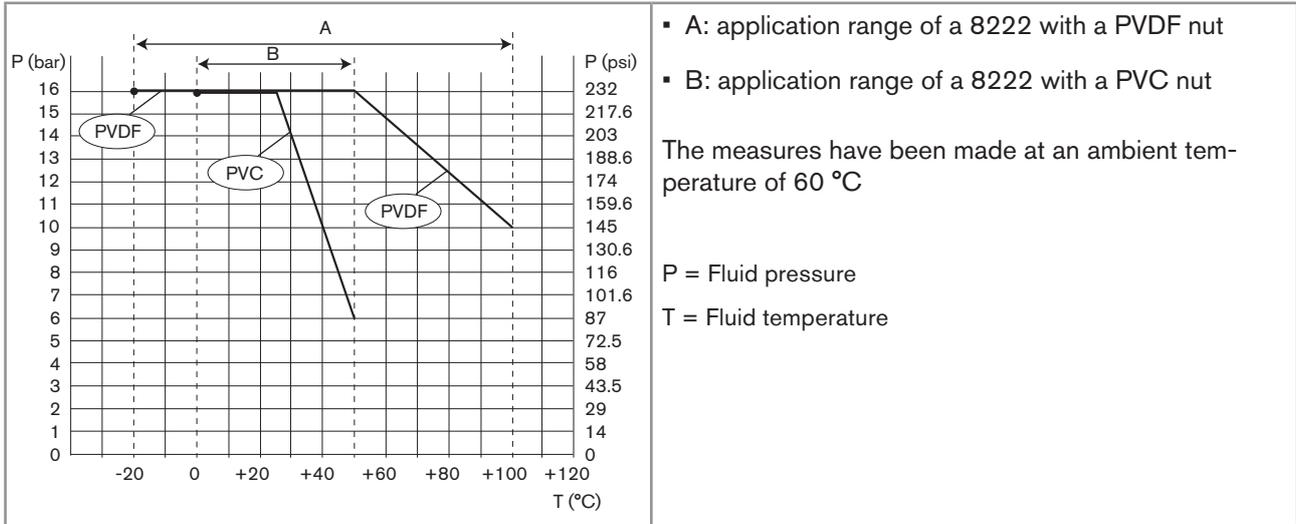


Fig. 3 : Dependency between the fluid temperature and the fluid pressure, Type 8222 with a PVC nut or PVDF nut

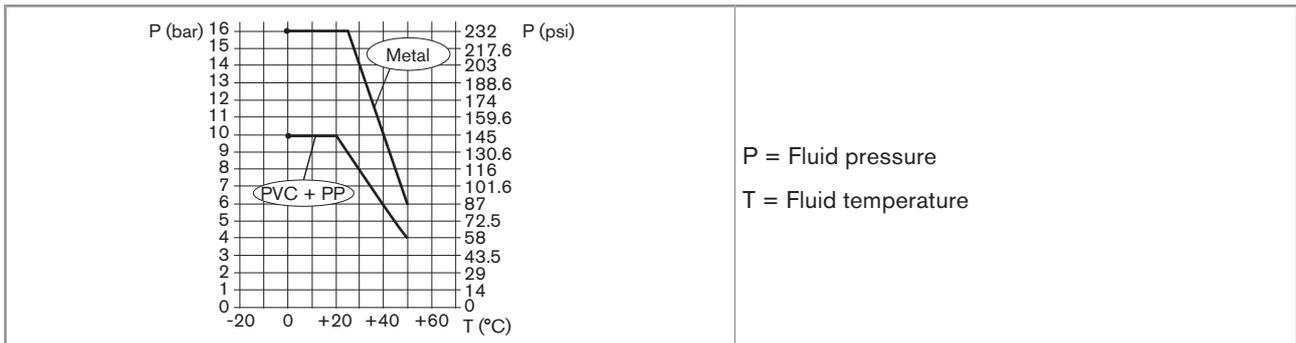


Fig. 4 : Dependency between the fluid temperature and the fluid pressure, Type 8222, with a PVC nut, and a Type S022 in metal, PVC or PP

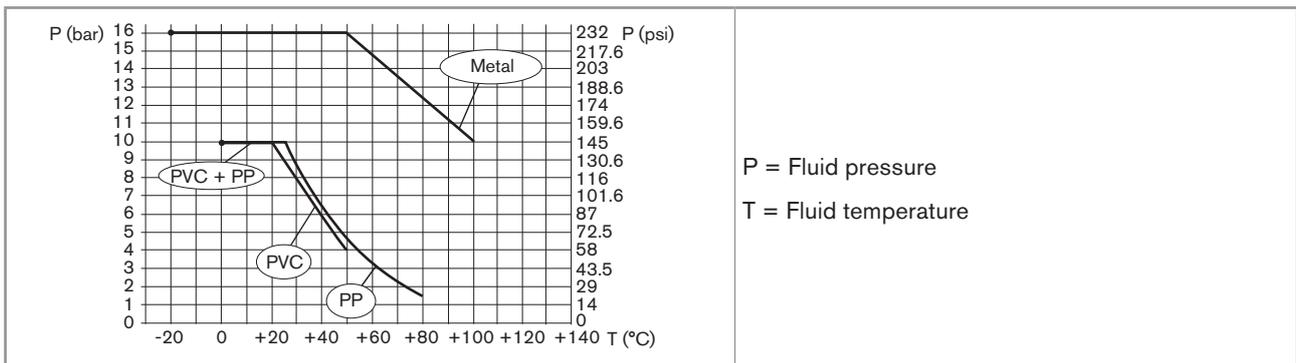


Fig. 5 : Dependency between the fluid temperature and the fluid pressure, Type 8222, with a PVDF nut and a Type S022 in metal, PVC or PP

6.6 Electrical data

Operating voltage	
▪ Device variant with 3 outputs	<ul style="list-style-type: none"> ▪ 14...36 V DC ▪ connection to main supply: permanent through external safety extra-low voltage (SELV) and through limited power source (LPS) ▪ filtered and regulated
▪ Device variant with 4 outputs	<ul style="list-style-type: none"> ▪ 12...36 V DC ▪ connection to main supply: permanent through external safety extra-low voltage (SELV) and through limited power source (LPS) ▪ filtered and regulated
Power source (not supplied)	<ul style="list-style-type: none"> ▪ limited power source according to UL/EN 60950-1 standard ▪ or limited energy circuit according to UL/EN 61010-1, Paragraph 9.4
Current consumption	
▪ Device variant with 3 outputs	▪ 25 mA max. (at 14 V DC)
▪ Device variant with 4 outputs	▪ 5 mA max. (at 12 V DC)
Current consumption, with loads on the transistors	1 A max.
Power consumption	40 W max.
Protection against polarity reversal	yes
Protection against voltage spikes	yes
Transistor output	polarized
▪ type	▪ NPN or PNP. Through wiring and through software setting
▪ NPN output	▪ 1...36 V DC, 700 mA max. (or 500 mA max. if 2 transistor outputs are wired)
▪ PNP output	▪ supply voltage, 700 mA max. (or 500 mA max. if 2 transistor outputs are wired)
▪ protection	▪ galvanically insulated, protected against overvoltages, polarity reversals and short-circuits
Current output	4...20 mA, sink or source through wiring and through software setting, 22 mA to indicate a fault (software setting)
▪ Response time (10...90%)	▪ 150 ms (default value)
▪ Device variant with 1 current output	▪ maximum loop impedance: 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 180 Ω at 14 V DC
▪ Device variant with 2 current outputs	▪ maximum loop impedance: 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC

6.7 Sensor specifications

Conductivity sensor C=0.01	
▪ Measurement range	▪ 0.05...20 µS/cm
▪ Type of fluid	▪ ultra-pure water, pure water
Conductivity sensor C=0.1	
▪ Measurement range	▪ 0.5...200 µS/cm
▪ Type of fluid	▪ pure water, industrial wastewater
Conductivity sensor C=1	
▪ Measurement range	▪ 5 µS/cm to 10 mS/cm
▪ Type of fluid	▪ industrial wastewater, wastewater

6.8 Data of connectors and cables

Number of fixed connectors	Type of connector
1 male M12 fixed connector	5-pin female M12 connector (not supplied). For the M12 connector with article number 917116, use a shielded cable: ▪ diameter: 3...6.5 mm ▪ wire cross section: max. 0.75 mm ²
1 male M12 fixed connector and 1 female M12 fixed connector	5-pin female M12 connector (not supplied) and 5-pin male M12 connector (not supplied). For the M12 connector with article number 917116, use a shielded cable: ▪ diameter: 3...6.5 mm ▪ wire cross section: max. 0.75 mm ²

7 ASSEMBLY

7.1 Safety instructions

WARNING

Risk of injury due to non-conforming assembly.

- ▶ The device must only be assembled by qualified and skilled staff with the appropriate tools.

Risk of injury due to unintentional switch on of power supply or uncontrolled restart of the installation.

- ▶ Avoid unintentional activation of the installation.
- ▶ Guarantee a defined or controlled restart of the process subsequent to any intervention on the device.

7.2 Removing the housing lid

NOTICE

The tightness of the device is not guaranteed when the housing lid is removed.

- ▶ Prevent the projection of liquid inside the housing.

The device may be damaged if a metal component comes into contact with the electronics.

- ▶ Prevent contact of the electronics with a metallic item.

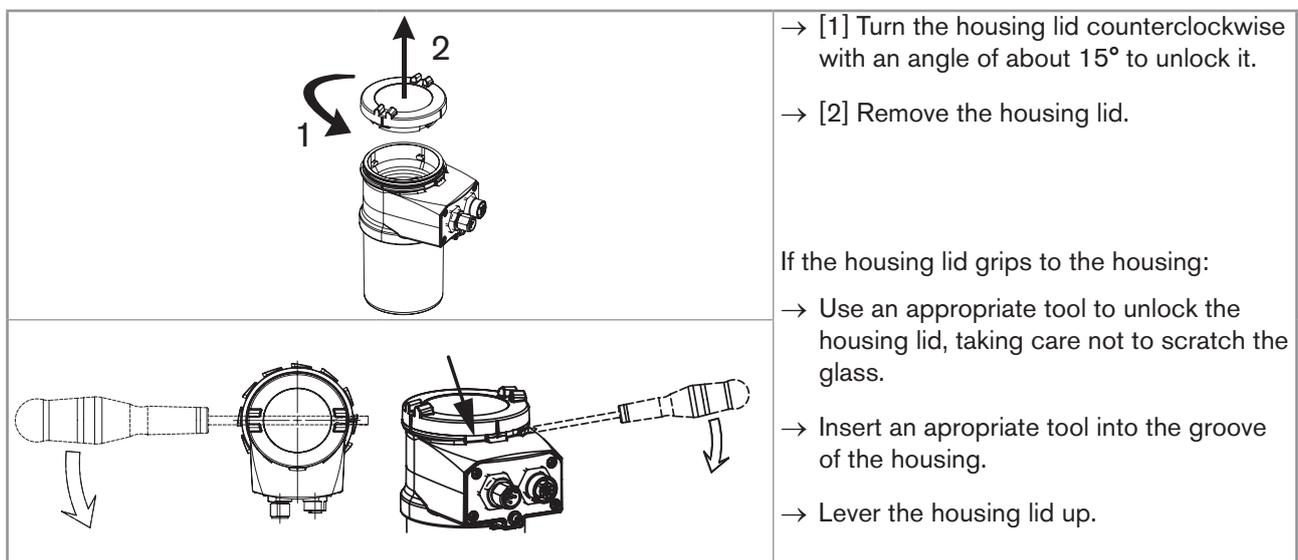


Fig. 6 : Removing the housing lid

7.3 Mounting the housing lid

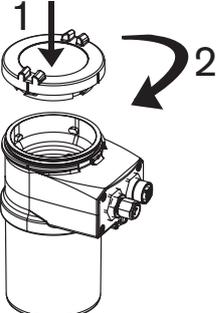
	<ul style="list-style-type: none"> → Check that there is a seal on the housing and that it is not damaged. Replace the seal if necessary. → Grease the seal if necessary, using a component compatible with the seal material. → [1] Set the housing lid to ensure that the 4 grooves of the housing lid match with the 4 pins of the housing. → [2] Turn the housing lid clockwise with an angle of about 15° to lock it.
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Fig. 7 : Closing the housing lid

7.4 Mounting the display module

NOTICE

The tightness of the device is not guaranteed when the housing lid is removed.

- ▶ Prevent the projection of liquid inside the housing.

The device may be damaged if a metal component comes into contact with the electronics.

- ▶ Prevent contact of the electronics with a metallic item.

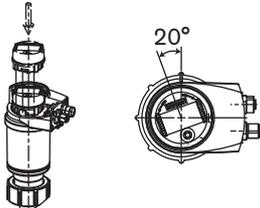
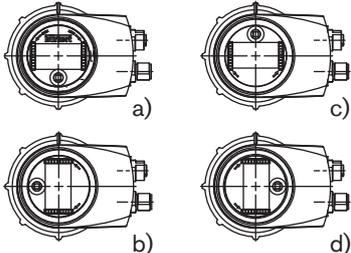
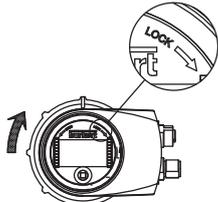
	<ul style="list-style-type: none"> → Remove the housing lid. Refer to chpt. 7.2. → Set the display module at an angle of ca. 20° in relation to the desired position.
	<ul style="list-style-type: none"> → The display module can be mounted in 4 different positions, at 90° intervals.
	<ul style="list-style-type: none"> → Fully push in the display module and turn clockwise to lock it. → Put the housing lid back.

Fig. 8 : Mounting the display module

7.5 Dismounting the display module

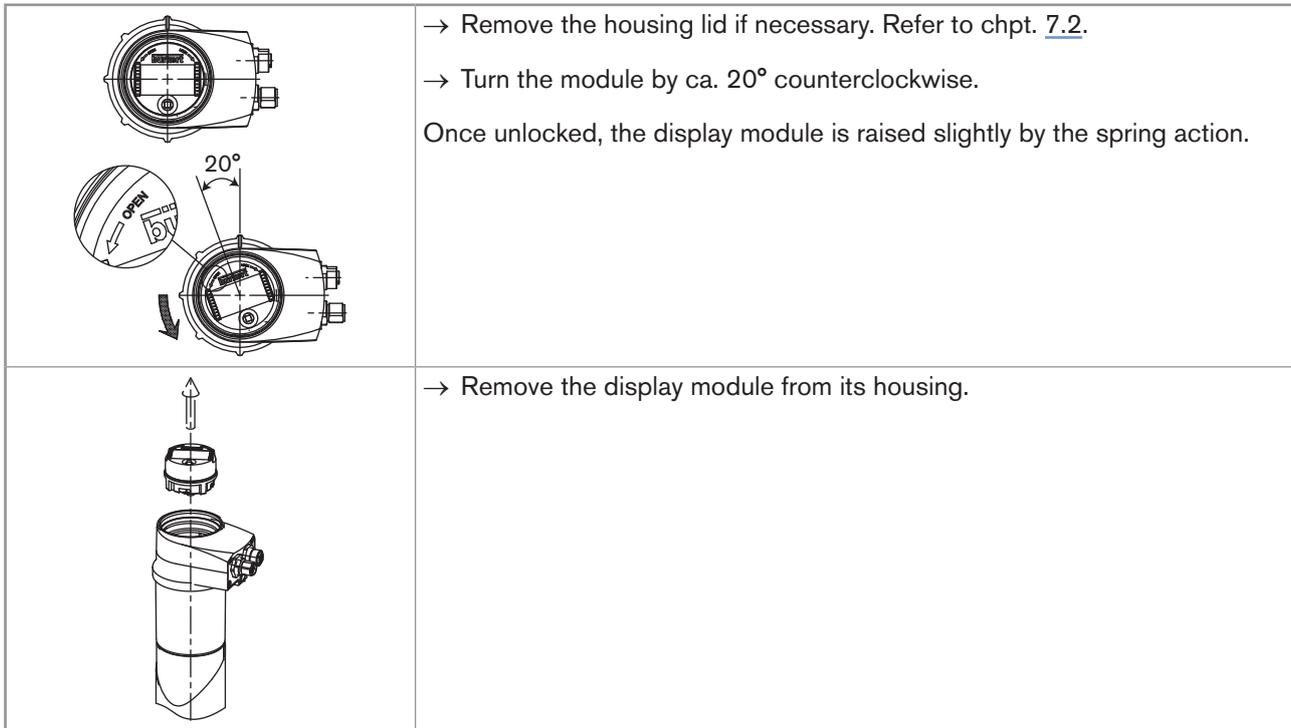


Fig. 9 : Dismounting the display module

8 INSTALLATION AND WIRING

8.1 Safety instructions



Risk of injury due to electrical voltage.

- ▶ Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- ▶ If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- ▶ All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- ▶ Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to pressure in the installation.

- ▶ Before any intervention in the installation, stop the circulation of fluid, cut off the pressure and drain the pipe.
- ▶ Before any intervention in the installation, make sure that there is no pressure in the pipe.
- ▶ Observe the dependency between the fluid temperature and the fluid pressure.

Risk of burns due to high fluid temperatures.

- ▶ Use safety gloves to handle the device.
- ▶ Before opening the pipe, stop the circulation of fluid and drain the pipe.
- ▶ Before opening the pipe, make sure that the pipe is completely empty.

Risk of injury due to the nature of the fluid.

- ▶ Respect the prevailing regulations on accident prevention and safety relating to the use of dangerous fluids.



WARNING

Risk of injury due to non-conforming installation.

- ▶ The electrical and fluid installation can only be carried out by qualified and skilled staff with the appropriate tools.
- ▶ Install appropriate safety devices (correctly rated fuse and/or circuit-breaker).
- ▶ Respect the installation instructions for the fitting used.

Risk of injury due to unintentional switch on of power supply or uncontrolled restart of the installation.

- ▶ Avoid unintentional activation of the installation.
- ▶ Guarantee a defined or controlled restart of the process after any intervention on the device.

8.2 Installing a device on the pipe

DANGER

Risk of injury due to pressure in the installation.

- ▶ Before any intervention in the installation, stop the circulation of fluid, cut off the pressure and drain the pipe.
- ▶ Before any intervention in the installation, make sure that there is no pressure in the pipe.

Risk of injury due to the nature of the fluid.

- ▶ Respect the prevailing regulations on accident prevention and safety relating to the use of dangerous fluids.

The device is inserted into a fitting installed on the pipe.

→ Select an appropriate position on the pipe. In [Fig. 10](#), prefer "A" mounting to install a device with sensor C=0.1 or C=0.01.

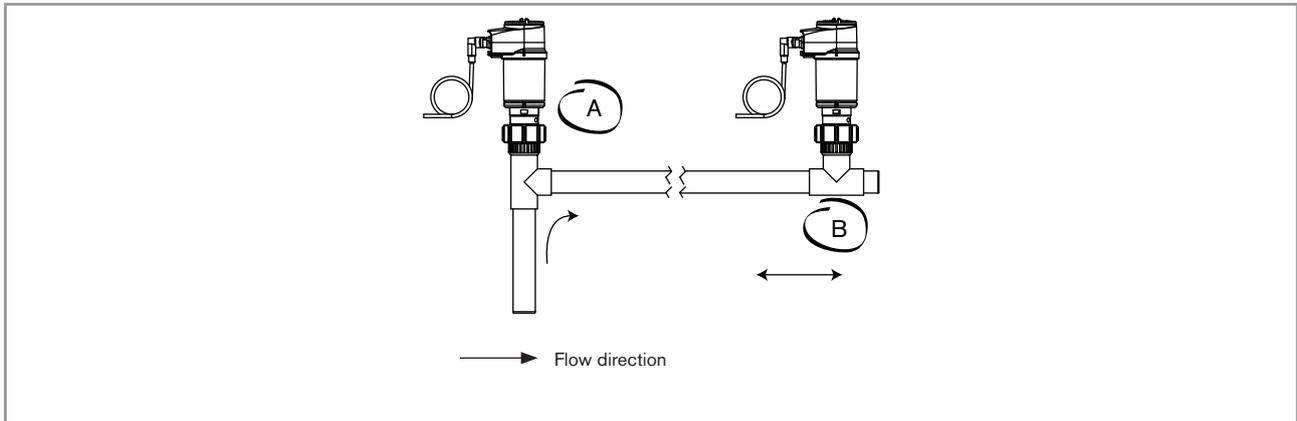


Fig. 10 : Mounting positions of the device in the pipe

- Fit the display module. Refer to [chpt. 7.4](#). The display module is needed to calibrate the device and to set the device parameters.
- Calibrate the device. Refer to [chpt. 9.12.4](#).

→ Mount the device into the fitting, as shown in Fig. 11:

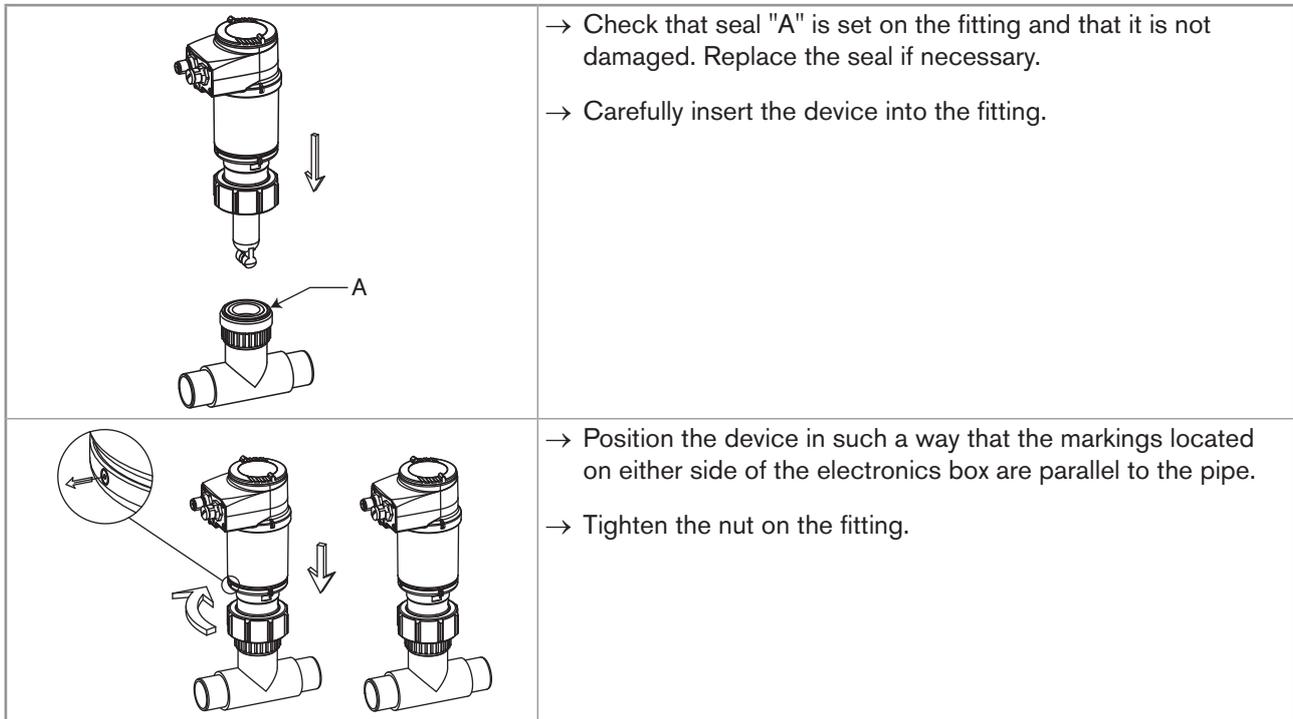


Fig. 11 : Installation of the device in a fitting

→ Wire the device according to instructions in chpt. [8.3](#).

8.3 Wiring

DANGER

Risk of injury due to electrical voltage.

- ▶ Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- ▶ If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- ▶ All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- ▶ Observe all applicable accident protection and safety regulations for electrical equipment.



- Use a high-quality electrical power supply. The power supply must be filtered and regulated.
- Make sure that the installation is equipotential. Refer to chpt. [8.3.2](#).
- Protect the power supply of the device with a 100 mA time-delay fuse and a switch.
- Protect the power supply of each transistor output with a 750 mA fuse.
- Once the device is wired, set the "HWMoDe" parameter depending on the wiring carried out, sink/NPN or source/PNP. Refer to chpt. [9.11.8](#).

8.3.1 Assembling the male or female connector (accessories)

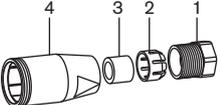
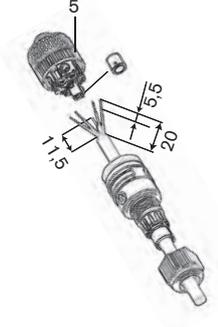
	<p>→ Unscrew the nut [1] on the body [4].</p> <p>→ Insert the cable into the nut [1], the cable clamp [2] and the seal [3], and then into the body [4].</p>
	<p>→ Strip 20 mm of the cable.</p> <p>→ Cut the central wire (earth) so that its length is equal to 11.5 mm.</p> <p>→ Expose 5.5 mm of the wires on the stripped cable.</p> <p>→ Insert each wire into the appropriate pin on the terminal block [5]. Refer to chpt. 8.3.3 or 8.3.4.</p> <p>→ Tighten the terminal block [5] wired to the body [4].</p> <p>→ Tighten the connector nut [1].</p>

Fig. 12 : M12 multi-pin connector (not provided)

8.3.2 Making the installation equipotential

To ensure the equipotentiality of the installation (power supply - device - medium):

- Connect together the various earth spots in the installation to eliminate the potential differences that may occur between different earthes.
- Observe faultless grounding of the shield of the power supply cable. Refer to [Fig. 13](#) and [Fig. 14](#).
- If the device is installed on plastic pipes, earth together the metallic equipment such as pumps or valves, that is as close as possible to the device. Refer to [Fig. 14](#).

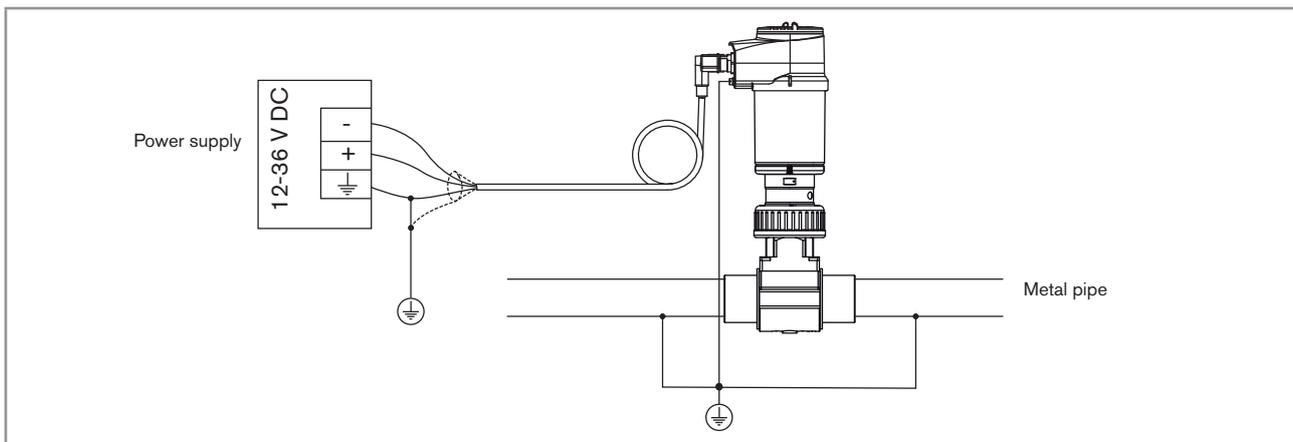


Fig. 13 : Equipotentiality skeleton diagram with pipes in metal

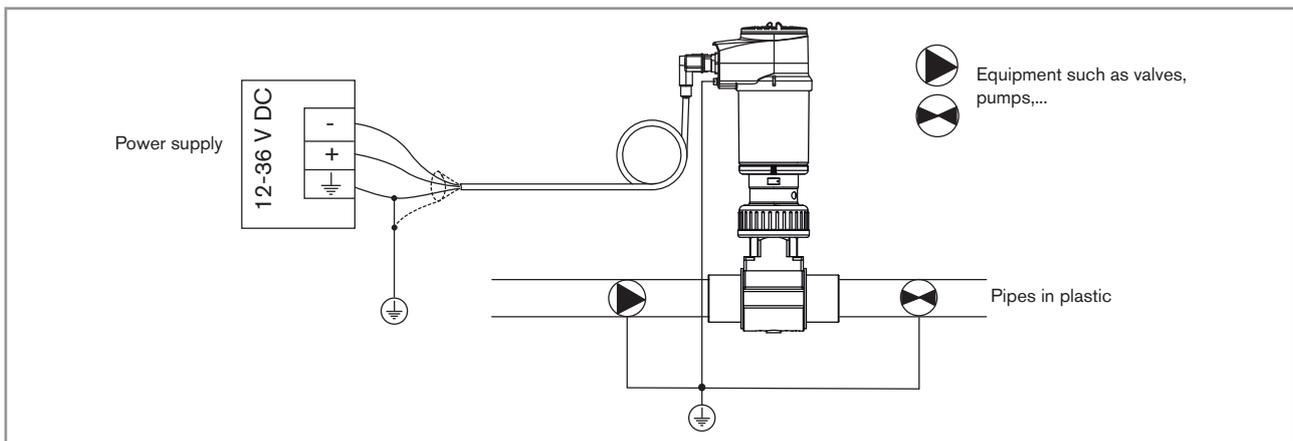


Fig. 14 : Equipotentiality skeleton diagram with pipes in plastic

8.3.3 Wiring a device variant with a single M12 fixed connector

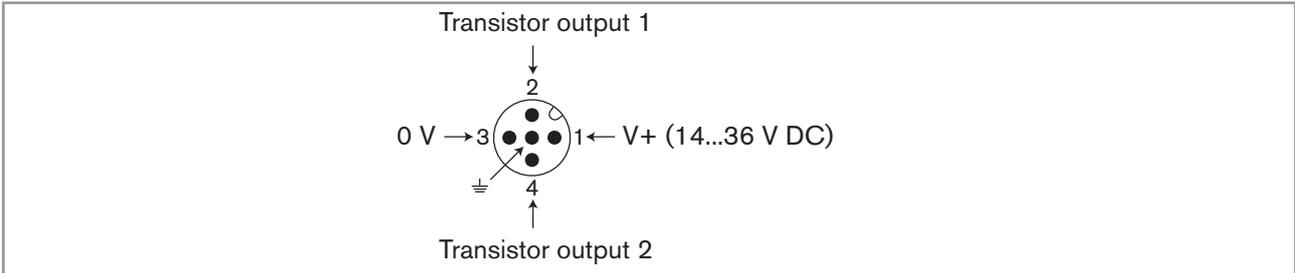


Fig. 15 : Pin assignment of the male fixed connector on a device variant with a single male M12 fixed connector

Pin of the M12 female cable available as an accessory (article number 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

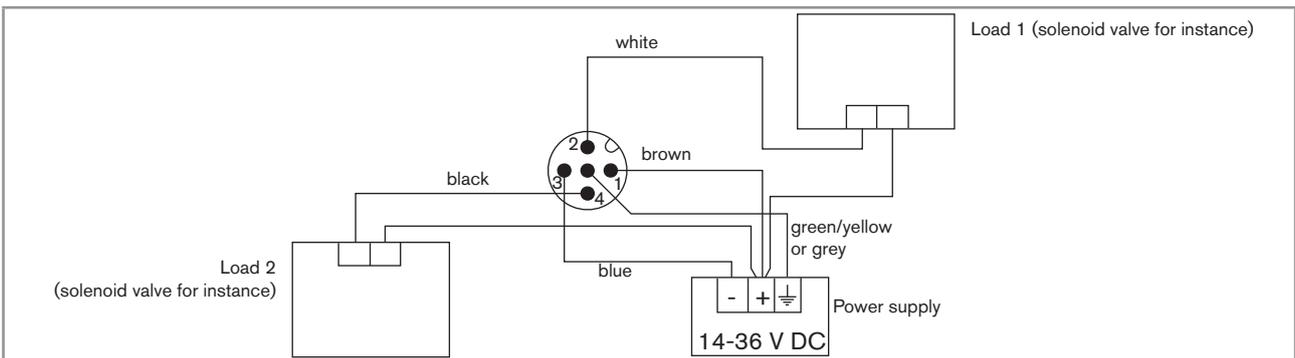


Fig. 16 : NPN wiring of both transistor outputs (software setting «NPN/sink», see chpt. 9.11.8), on a device variant with 1 fixed connector

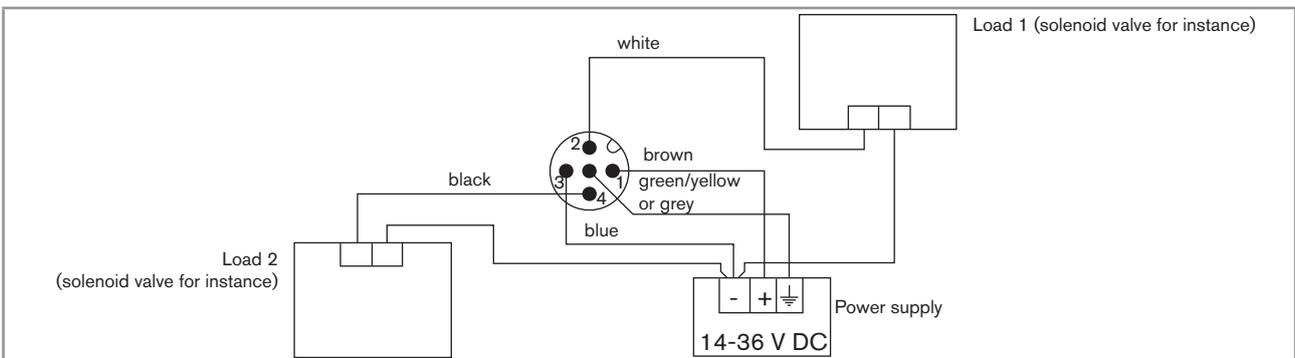


Fig. 17 : PNP wiring of both transistor outputs (software setting «PNP/source», see chpt. 9.11.8), on a device variant with 1 fixed connector

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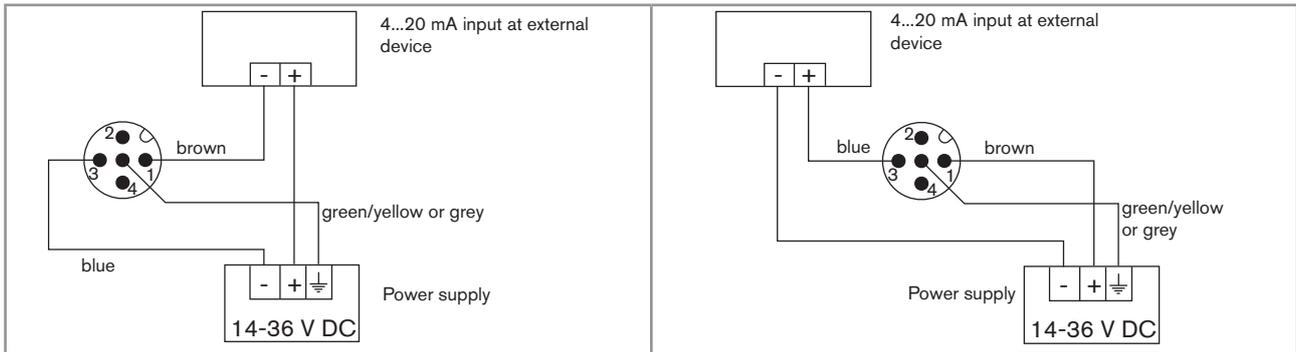


Fig. 18 : Possible connections of the current output (whatever the software setting, «NPN/sink» or «PNP/source», see chpt. 9.11.8), on a device variant with 1 fixed connector

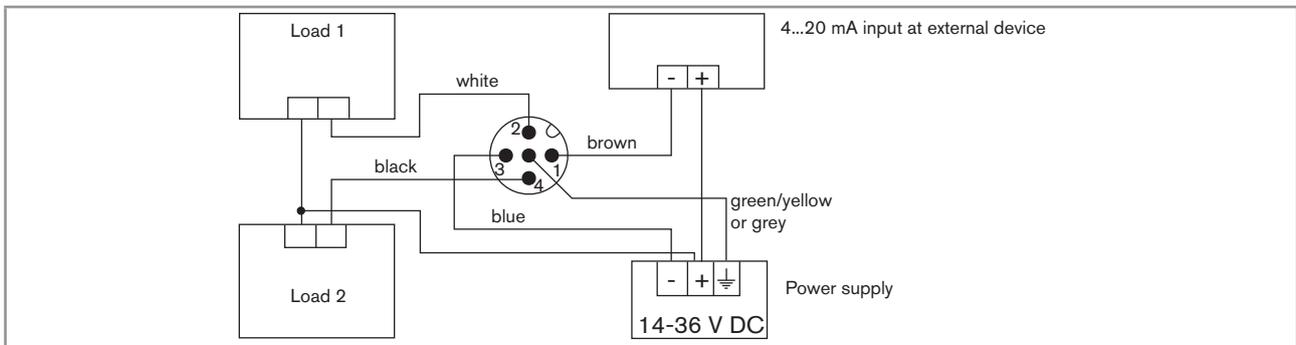


Fig. 19 : NPN wiring of both transistor outputs and wiring of the current output in sinking mode (software setting «NPN / sink», see chpt. 9.11.8), on a device variant with 1 fixed connector

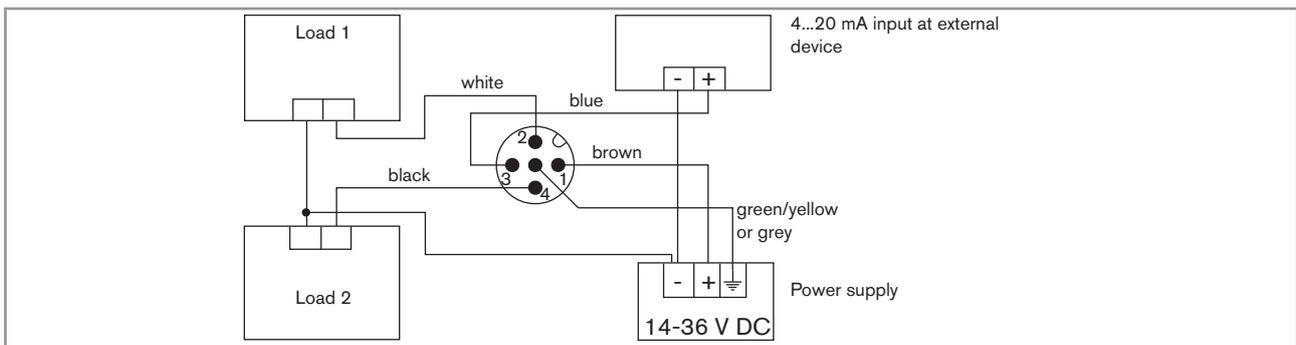


Fig. 20 : PNP wiring of both transistor outputs and wiring of the current output in sourcing mode (software setting «PNP / source», see chpt. 9.11.8), on a device variant with 1 fixed connector

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8.3.4 Wiring a device variant with 2 M12 fixed connectors

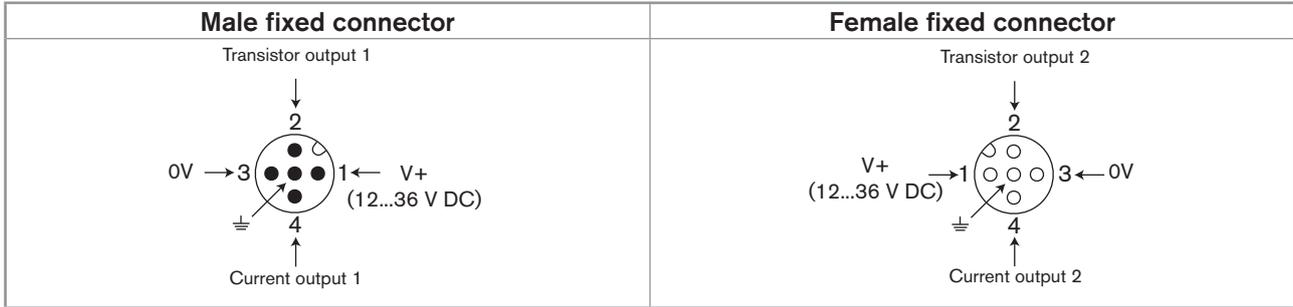


Fig. 21 : Pin assignment of the male and female M12 fixed connectors

! Connect the power supply for the device to the male fixed connector; the supply is then transferred internally to pins 1 and 3 of the female fixed connector in order to ease wiring of the load to the female fixed connector.

Pin of the M12 female cable available as an accessory (article number 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

Pin of the M12 male cable available as an accessory (article number 559177)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

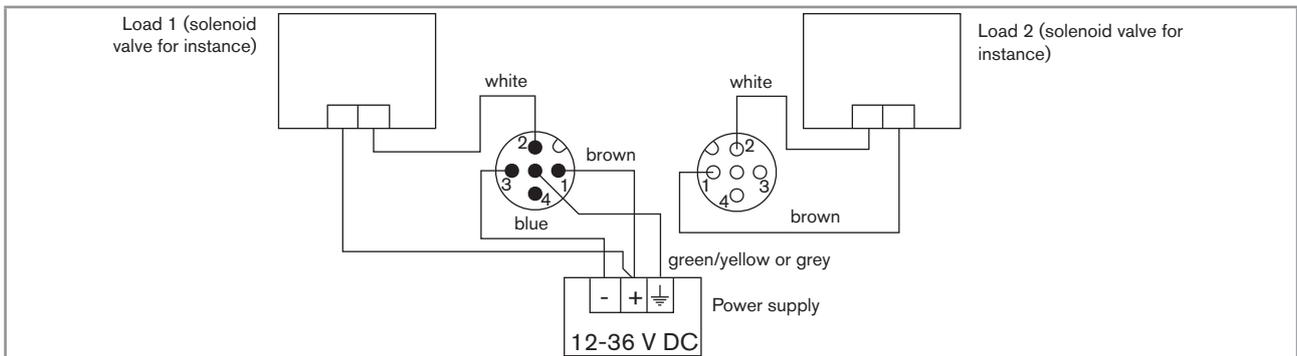


Fig. 22 : NPN wiring of both transistor outputs (software setting «NPN/sink», see chpt. 9.11.8), on a device variant with 2 fixed connectors

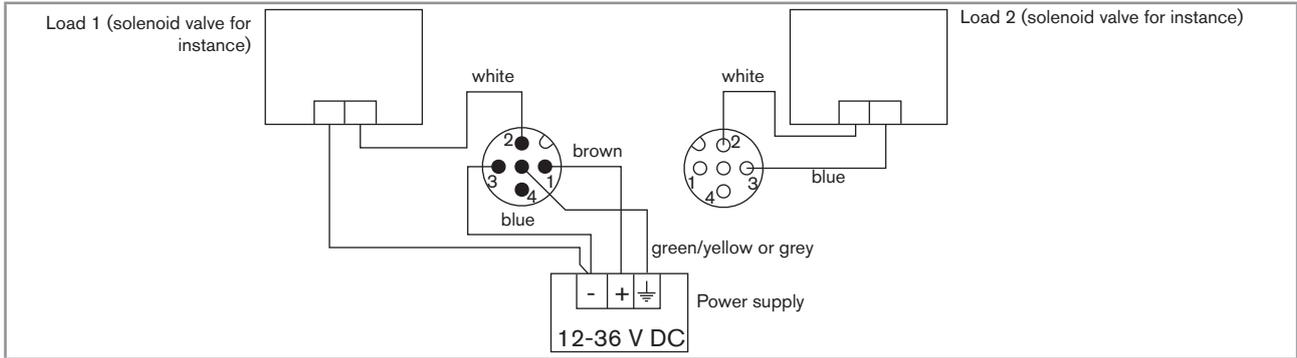


Fig. 23 : PNP wiring of both transistor outputs (software setting „PNP/source“, see chpt. 9.11.8), on a device variant with 2 fixed connectors

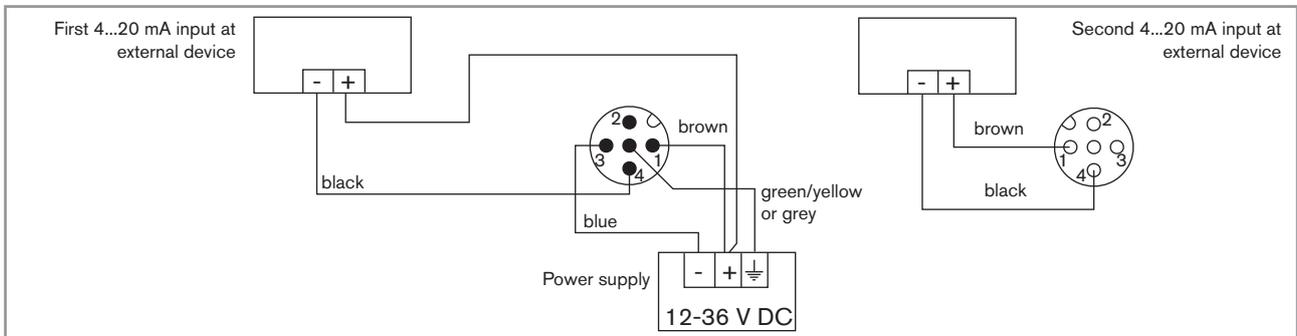


Fig. 24 : Wiring of both current outputs in sinking mode (software setting «NPN/sink», see chpt. 9.11.8), on a device variant with 2 fixed connectors

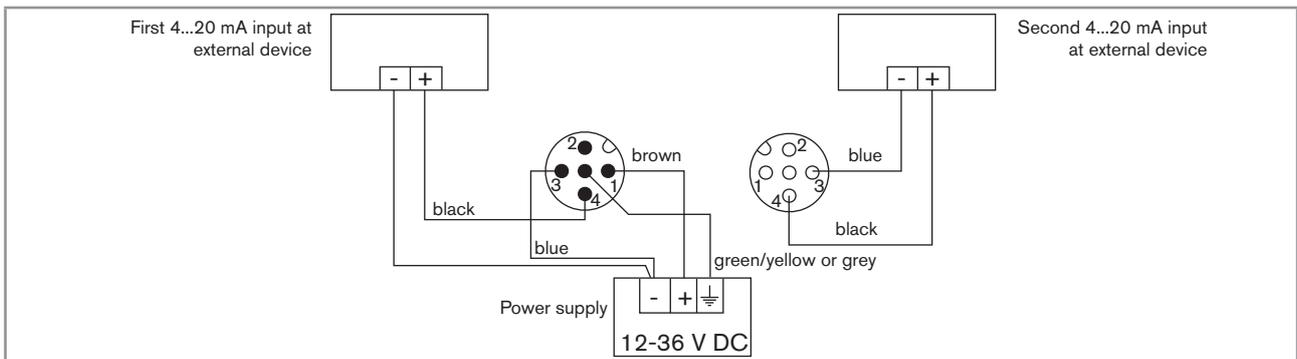


Fig. 25 : Wiring of both current outputs in sourcing mode (software setting «PNP/source“, see chpt. 9.11.8), on a device variant with 2 fixed connectors

MAN 100011235 EN Version: I Status: RL (released | freigegeben) printed: 07.07.2021

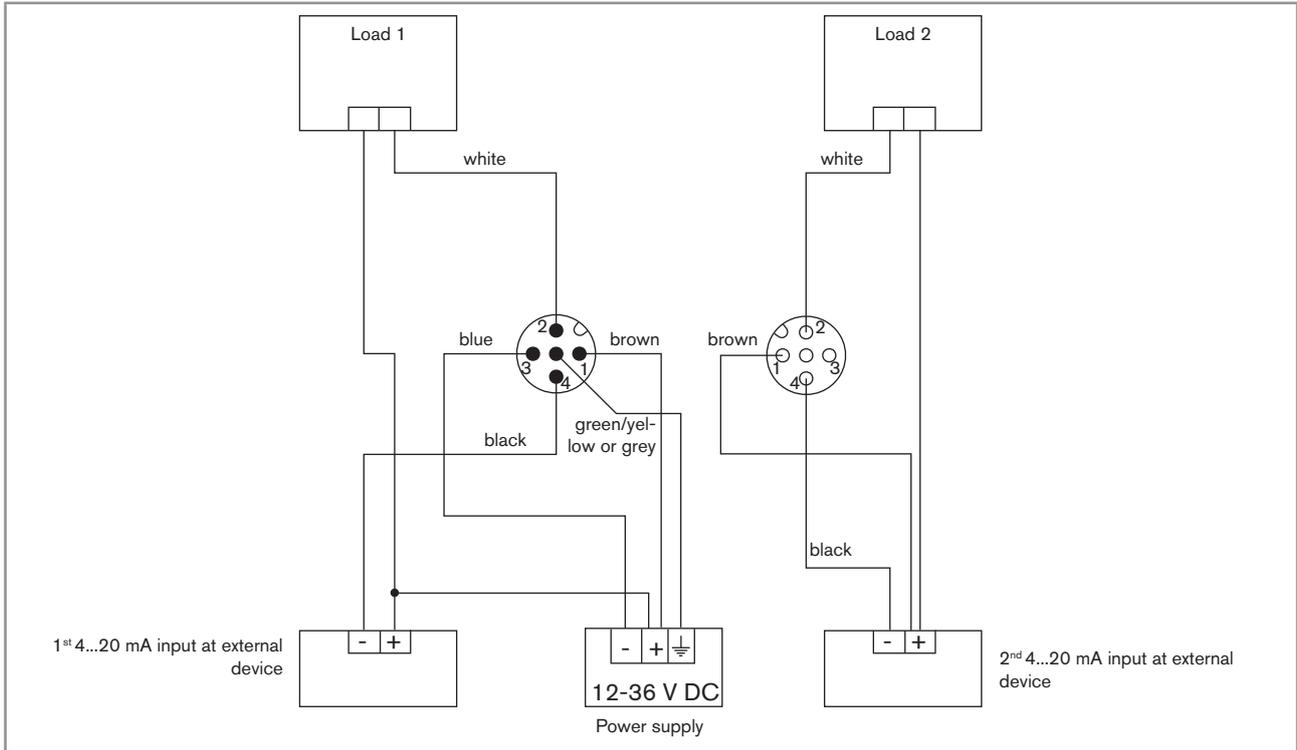


Fig. 26 : NPN wiring of both transistor outputs and wiring of both current outputs in sinking mode, on a device variant with 2 fixed connectors (software setting «NPN/sink», see chpt. 9.11.8)

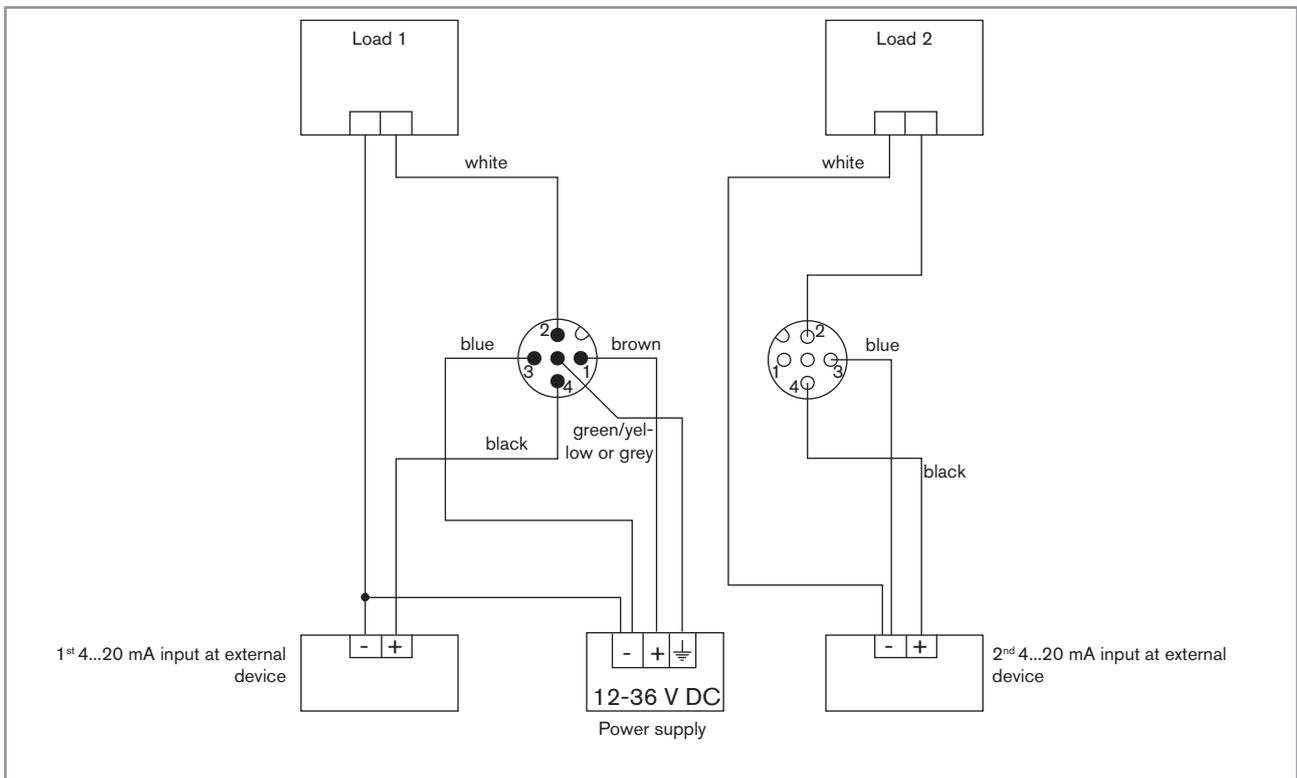


Fig. 27 : PNP wiring of both transistor outputs and wiring of both current outputs in sourcing mode, on a device variant with 2 fixed connectors (software setting «PNP/source», see chpt. 9.11.8)

9 ADJUSTMENT AND START-UP



- The settings can only be done on a device with a display module.
- Do not remove the display module while making the settings on the device.

9.1 Safety instructions



WARNING

Risk of injury due to non-conforming adjustment.

Non-conforming adjustment could lead to injuries and damage the device and its surroundings.

- ▶ The operators in charge of adjustment must have read and understood the contents of the Operating Instructions.
- ▶ In particular, observe the safety recommendations and intended use.
- ▶ The device/installation must only be adjusted by suitably trained staff.



WARNING

Danger due to nonconforming start-up.

Non-conforming start-up could lead to injuries and damage the device and its surroundings.

- ▶ Before start-up, calibrate the conductivity sensor. Refer to chpt. [9.12.4](#).
- ▶ Before start-up, make sure that the staff in charge have read and fully understood the contents of the Operating Instructions.
- ▶ In particular, observe the safety recommendations and intended use.
- ▶ The device/installation must only be commissioned by suitably trained staff.

9.2 Knowing the operating levels

The device has 2 operating levels:

Process level

This level is used:

- to read the measured values of 2 process values selected in the Parameters menu,
- to read both the lowest and highest values of the chosen process value, that have been measured by the device since the latest reset (this feature is not active by default),
- to reset both the lowest and highest values of the chosen process value, if the feature has been activated,
- to read the current values emitted on the 4...20 mA outputs.
- to get the state of the device and of the conductivity sensor with the icons.

Configuration level

This level comprises 5 menus:

Menu title	Related icon
"Param": see chpt. 9.11 .	
"Calib": see chpt. 9.12 .	
"Diagnostic": see chpt. 9.13 .	
"Test": see chpt. 9.14 .	
"Info": see chpt. 9.15 .	

9.3 Using the navigation button

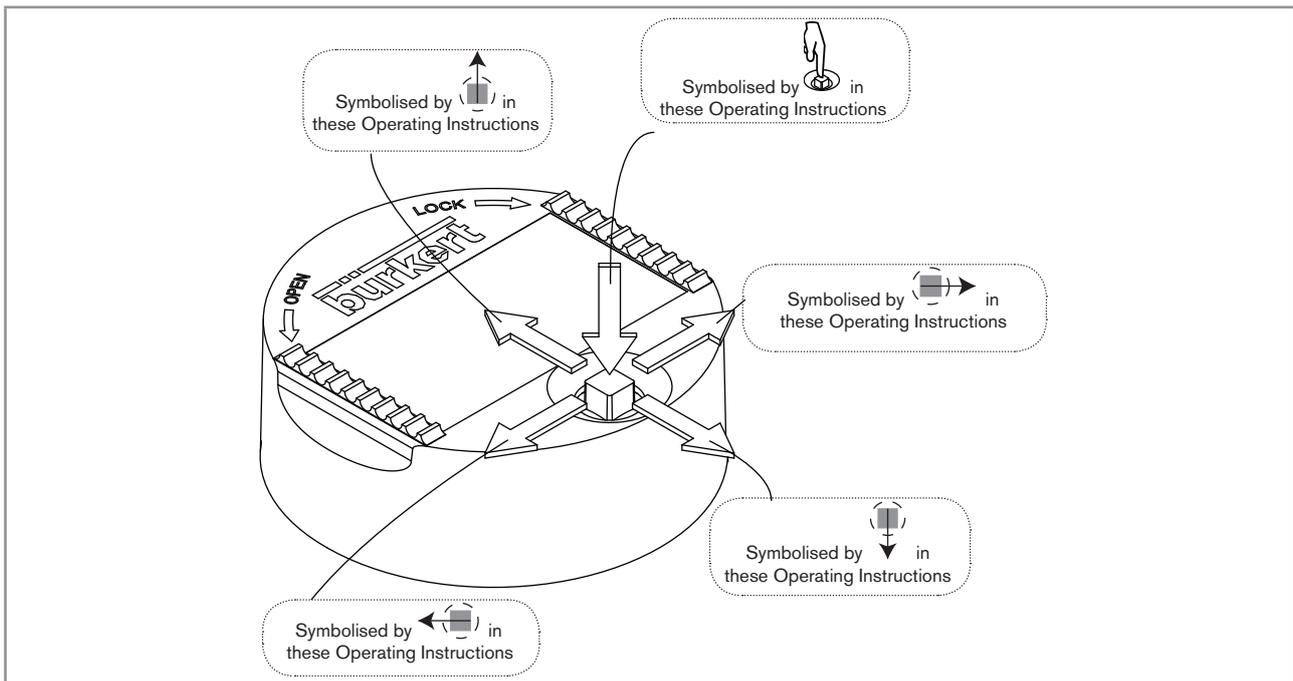


Fig. 28 : Using the navigation button

You want to...	Press...
...browse in Process level	<ul style="list-style-type: none"> ▪ next screen:  ▪ previous screen: 
<ul style="list-style-type: none"> ▪ ...access the Configuration level ▪ ...display the Param menu 	 for at least 2 sec., from any screen of the Process level
...browse in the menus of the Configuration level	<ul style="list-style-type: none"> ▪ next menu:  ▪ previous menu: 
...access the menu displayed	
...browse in the menu functions	<ul style="list-style-type: none"> ▪ next function:  ▪ previous function: 
...select the highlighted function	
...browse in the dynamic functions bar (MEAS, BACK, ABORT, OK, YES, NO)	<ul style="list-style-type: none"> ▪ next function:  ▪ previous function: 
...confirm the highlighted dynamic function	
...modify a numerical value	
- increment the figure selected	- 
- decrement the figure selected	- 
- select the previous figure	- 
- select the next figure	- 
- allocate the "+" or "-" sign to the numerical value	-  to the extreme left of the numerical value then  until the desired sign is displayed
- move the decimal point	-  to the extreme right of the numerical value then  until the decimal point is in the desired place

9.4 Using the dynamic functions

You want to...	Choose...
...go back to the Process level, without validating the modifications made	dynamic function "MEAS"
...validate the input	dynamic function "OK"
...go back to the parent menu	dynamic function "BACK"
... abort the current operation and go back to the parent menu	dynamic function "ABORT"
...answer the question asked	dynamic function "YES" or "NO"

9.5 Entering a numerical value (example)

Modify each digit of the numerical value using:

- ↑ to increase the digit selected,
- ↓ to decrease the digit selected.

Select the digit at the extreme left of the numerical value with ← then allocate the "+" or "-" sign to the numerical value with ←.

Select the digit at the extreme right of the numerical value with → then move the decimal point with →.

Dynamic functions (accessible through ← and →): see chpt. 9.4.

9.6 Browsing in a menu (example)

The icon identifies the current menu

Title of the current menu, sub-menu or function.

Highlighted function

The arrow indicates that some more functions are available which can be displayed by using ↑

The arrow indicates that some more functions are available which can be displayed by using ↓

Dynamic functions (accessible through ← and →): see chpt. 9.4.

9.7 Knowing the display

! The display module is only equipped on some device variants of the device. It can be ordered as an accessory.

9.7.1 Knowing the icons and LEDs

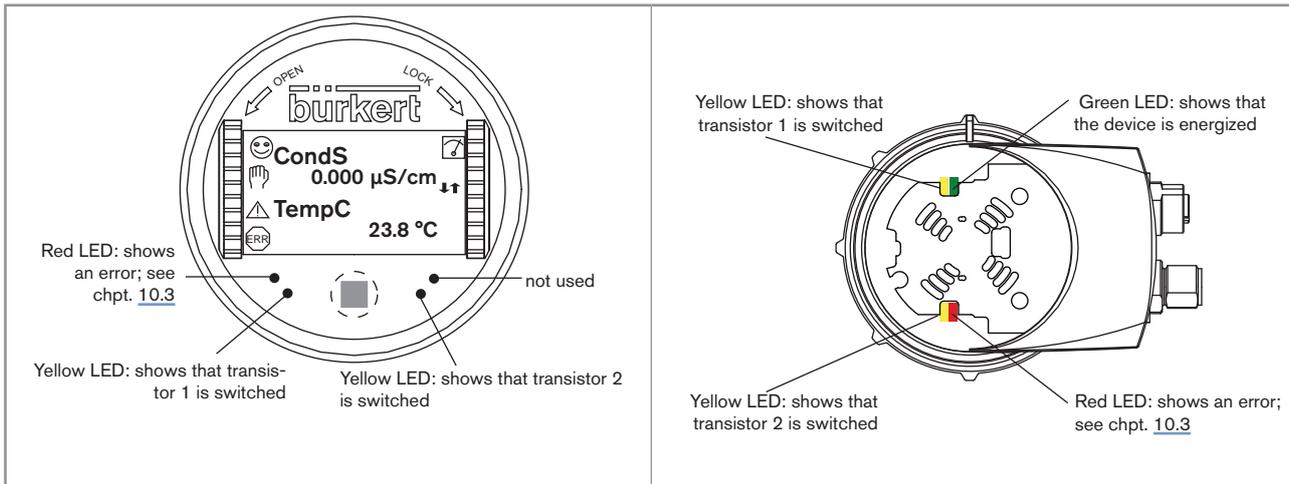


Fig. 29 : Position of the symbols and description of the LEDs with or without display module

! The LEDs of the display module are duplicated on the electronic board that is located under the display module: these LEDs can only be seen if the device has no display module.

Icon	Meaning and alternatives
☺	Sensor in good condition, fluid conductivity and fluid temperature within the set ranges. If the monitoring of the conductivity and/or the fluid temperature and/or the fluid conductivity has been activated, the alternative icons in this position are: <ul style="list-style-type: none"> ☺, associated with ⚠: see chpt. 9.13.2, 9.13.3, 9.13.4, 9.15.1 and 10.3 ☺, associated with ERR: see chpt. 9.13.2, 9.13.3, 9.13.4, 9.15.1 and 10.3
🔍	The device is measuring. The alternative icons in this position are: <ul style="list-style-type: none"> 🔍 flashing: HOLD mode activated. Refer to chpt. 9.12.1. 🔍: running check that the outputs are working and behaving correctly. Refer to chpt. 9.14.2 and 9.14.3.
🔧	"maintenance" message; see chpt. 9.14.2 , 9.15.1 and 10.3
⚠	"warning" message; see chpt. 9.11.10 , 9.13.2 , 9.13.3 , 9.13.4 , 9.15.1 and 10.3
ERR	"error" message; see chpt. 9.13.2 , 9.13.3 , 9.13.4 , 9.15.1 and 10.3

9.7.2 Knowing the display at the power-up of the device

When the device is powered up or the display module mounted on the electronic module, the display indicates the software version of the display module. The display then shows the first screen of the Process level:

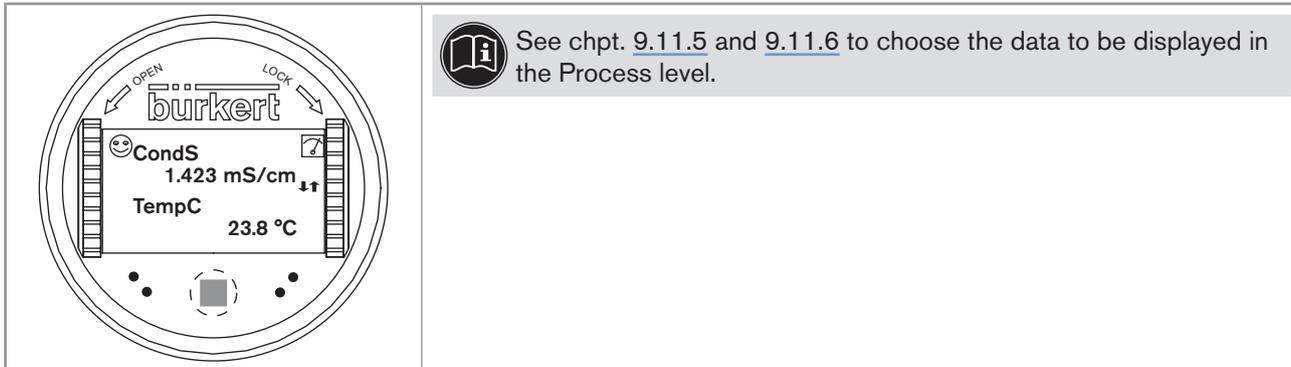
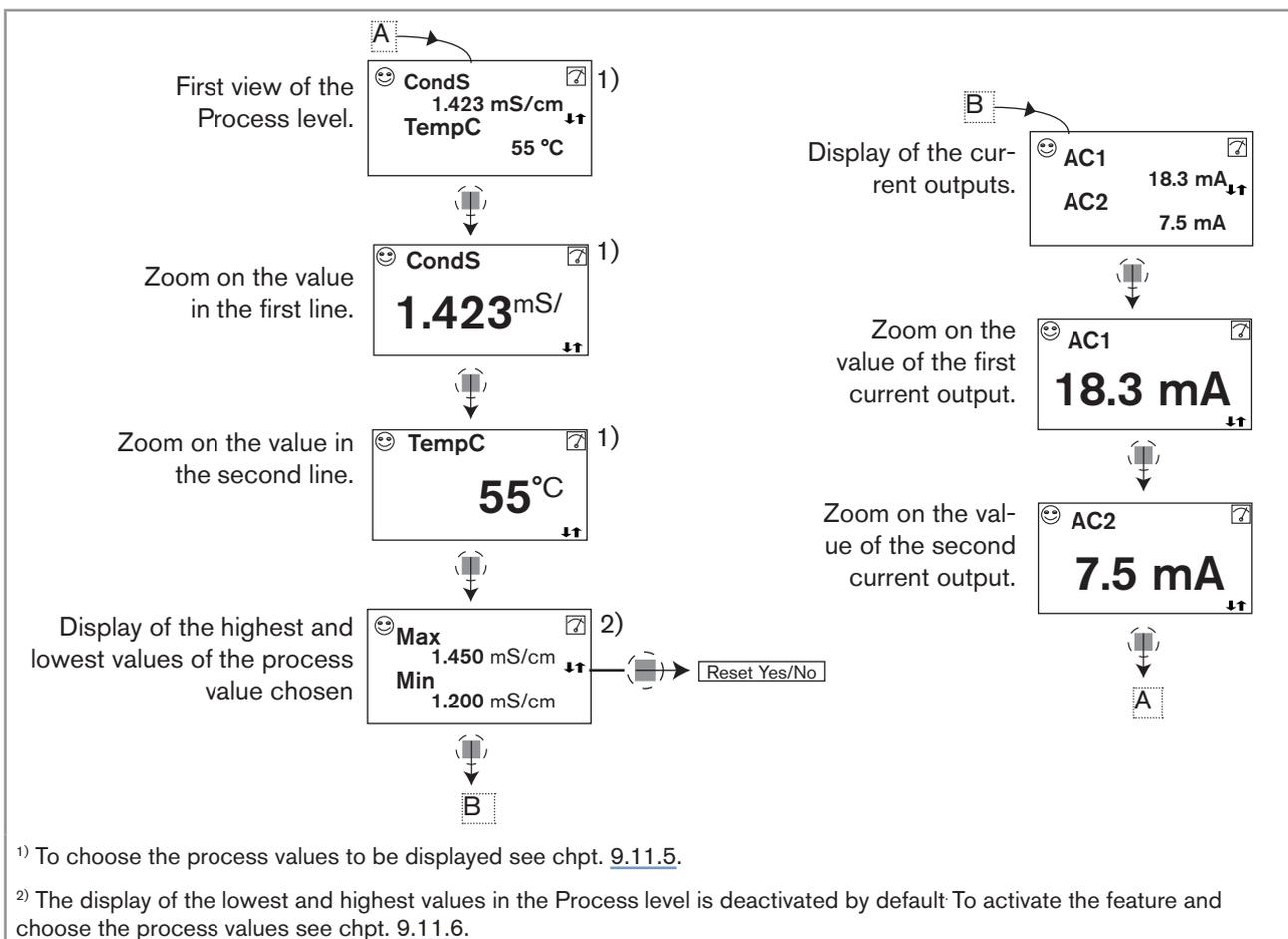
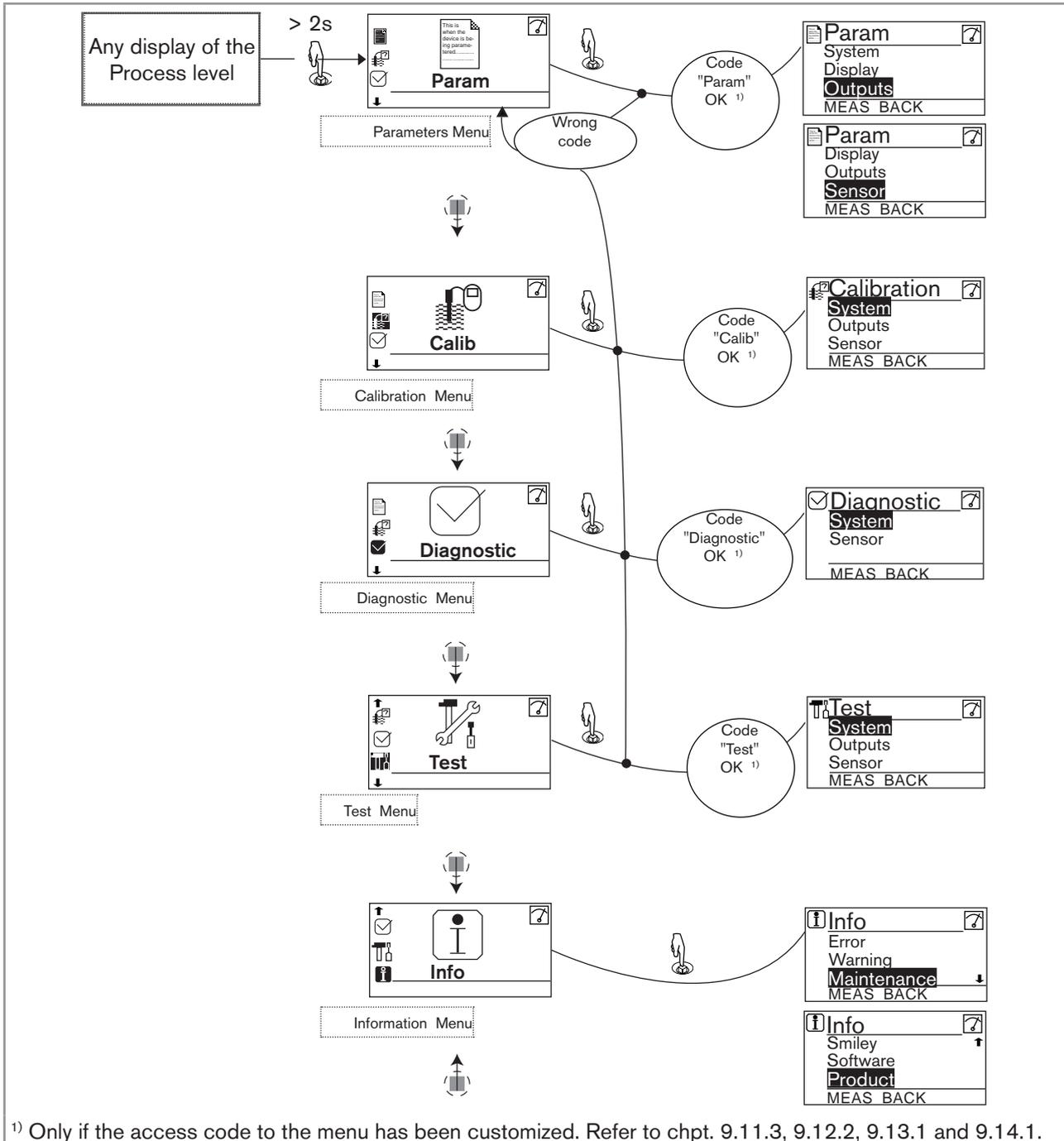


Fig. 30 : Display indications after power-up of the device

9.8 Knowing the Process level



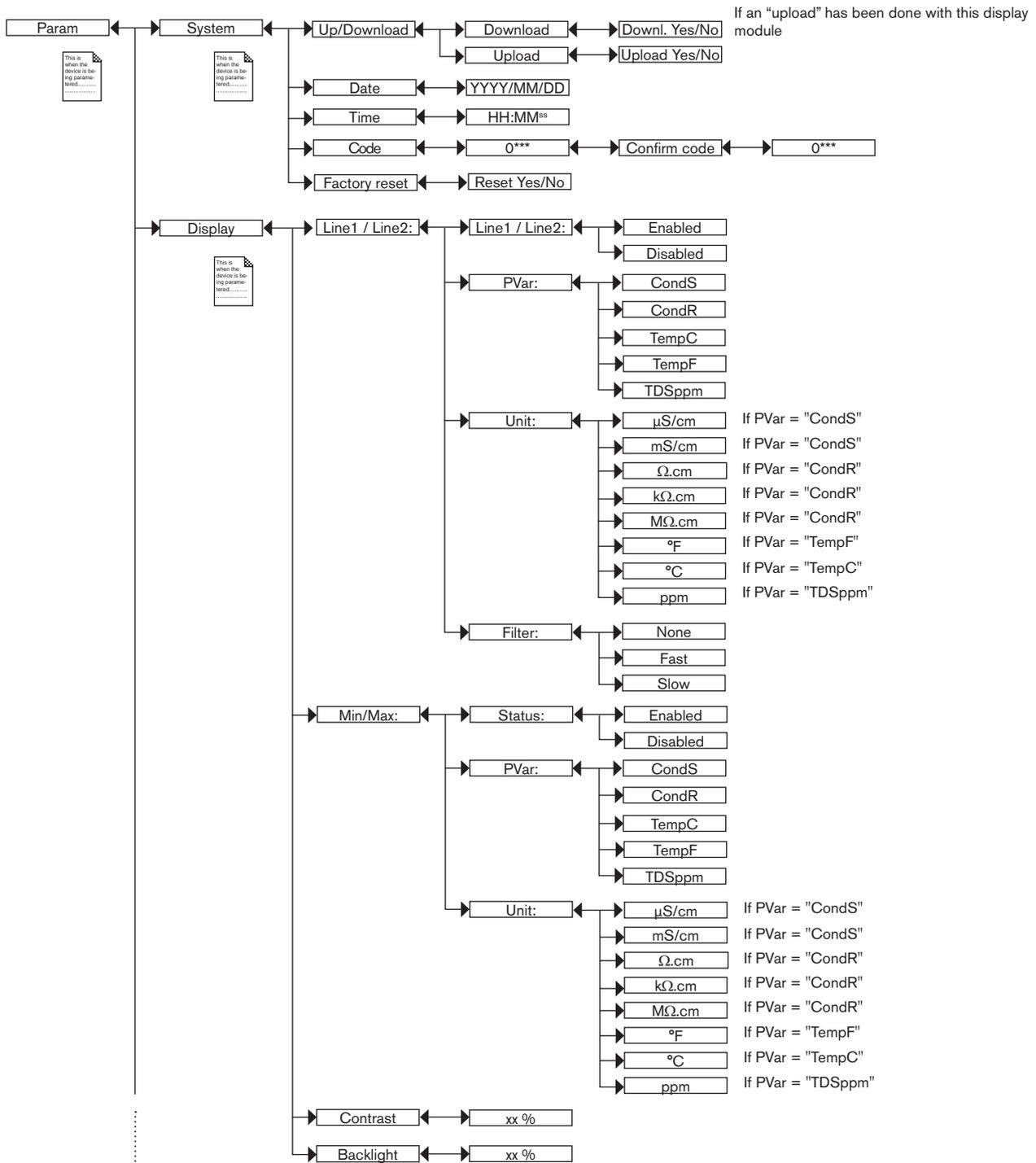
9.9 Accessing the Configuration level

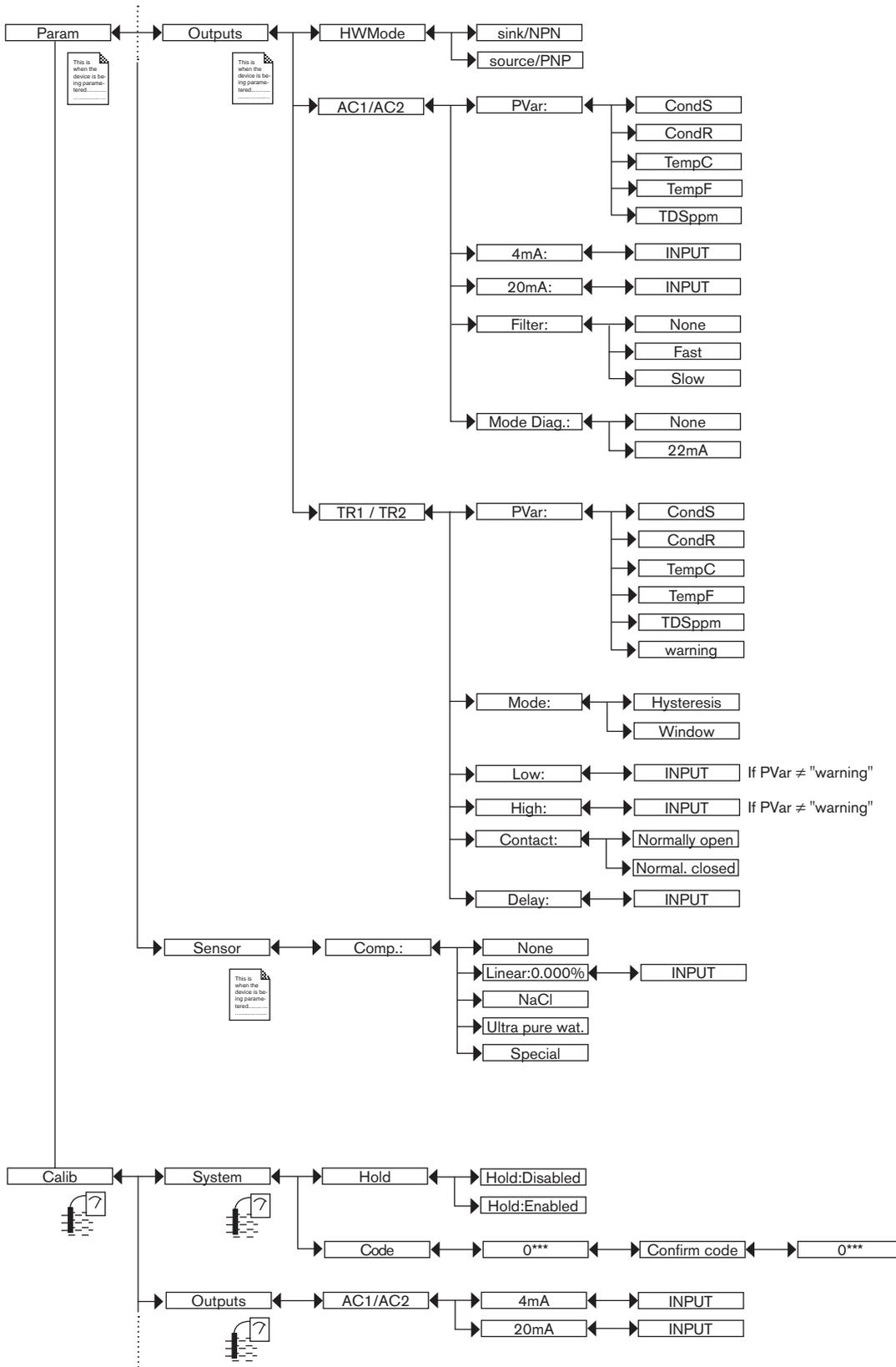


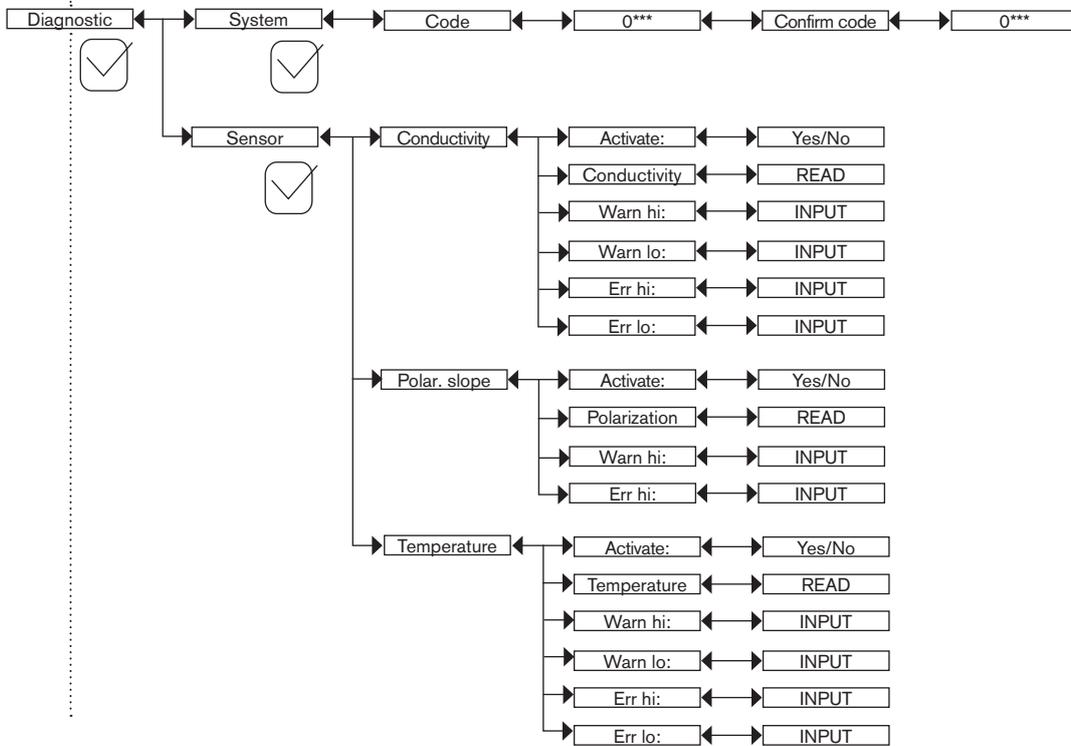
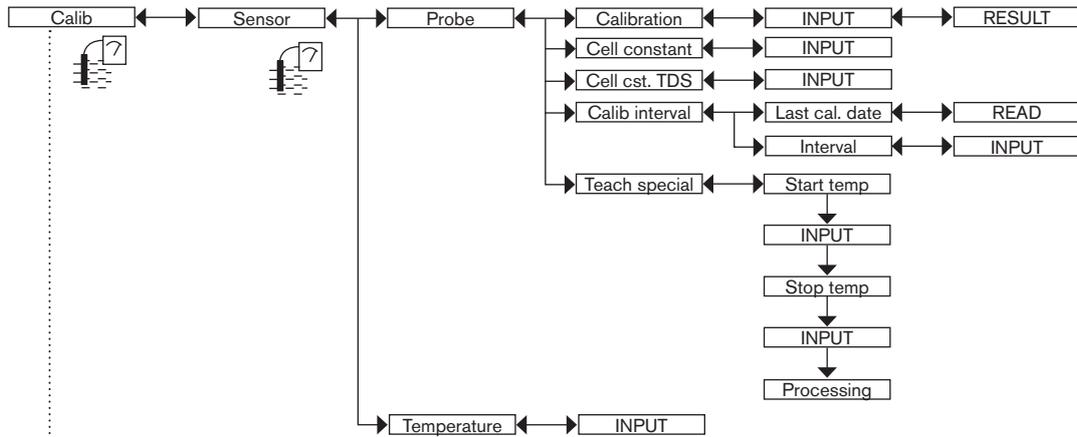
→ See chpt. 9.10 for the detailed menu functions.

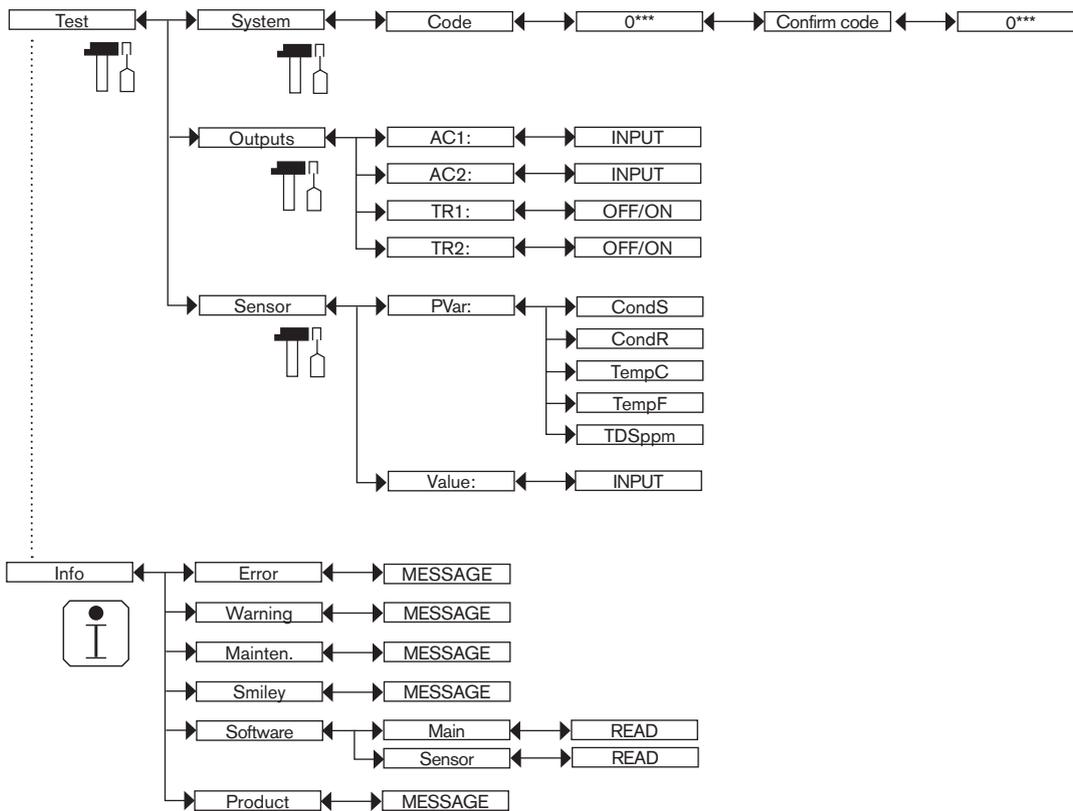
9.10 Knowing the structure of the menus on the Configuration level

See chpt. 9.9 to access the Configuration level.









9.11 Knowing the Parameters Menu

9.11.1 Transferring data from one device to another

See chpt. [9.9](#) to access the Parameters menu.



This function is only possible with a display module with software version V2.

→ On the device, check the software version in the menu "Info -> Software -> Main".

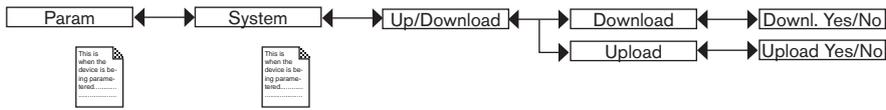
- The software version of the display module is displayed when the display module is powered up.



- Function "DOWNLOAD" is only present if an "UPLOAD" has been successfully carried out.
- Never interrupt a data transfer else the device could be damaged.



The compensation curve determined with the function TEACH SPECIAL cannot be transferred to another device. Refer to chpt. [9.12.4](#).



The following data can be transferred from one device to another device of the same type:

- user set data of the PARAM menu (except the date, the time, the contrast and brightness levels for the display),
- user set data of the DIAGNOSTIC menu,
- the TDS factor set in the menu Calib -> Sensor -> Probe -> Cell cst TDS,
- the periodicity of calibrations set in the menu Calib -> Sensor -> Probe -> Calib interval,
- the access codes to the menus.

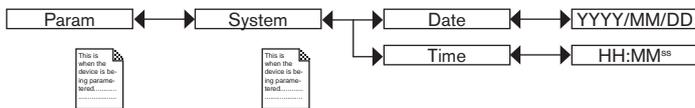
DOWNLOAD: transfer the data previously uploaded into the display module using the UPLOAD function.

The parameters transferred are used by the device as soon as the message “Download OK” is displayed.

UPLOAD: upload data from the device to the display module.

9.1.1.2 Setting the date and time

See chpt. 9.9 to access the Parameters menu.

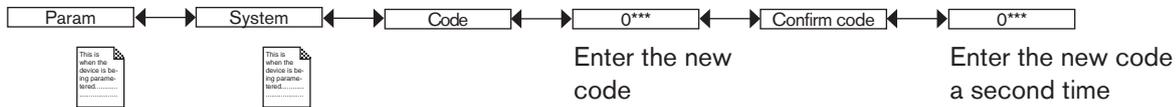


DATE: set the date (input format: year/month/day in the form YYYY/MM/DD)

TIME: set the time (input format: hours:minutes^{seconds})

9.11.3 Modifying the PARAM menu access code

See chpt. 9.9 to access the Parameters menu.



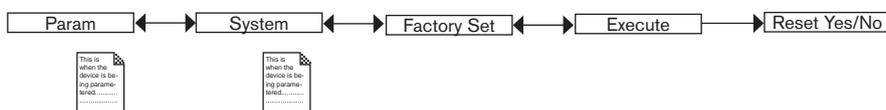
If the default code (0000) is entered, the code will not be requested to access the menu.

9.11.4 Restoring the default parameters of the Process level and the outputs

See chpt. 9.9 to access the Parameters menu.

The following data can be restored to their default values:

- user set data of the PARAM menu (except the date, the time, the contrast and brightness levels for the display),
- user set data of the DIAGNOSTIC menu,
- the TDS factor set in the menu Calib -> Sensor -> Probe -> Cell cst TDS,
- the periodicity of calibrations set in the menu Calib -> Sensor -> Probe -> Calib interval,
- the access codes to the menus.

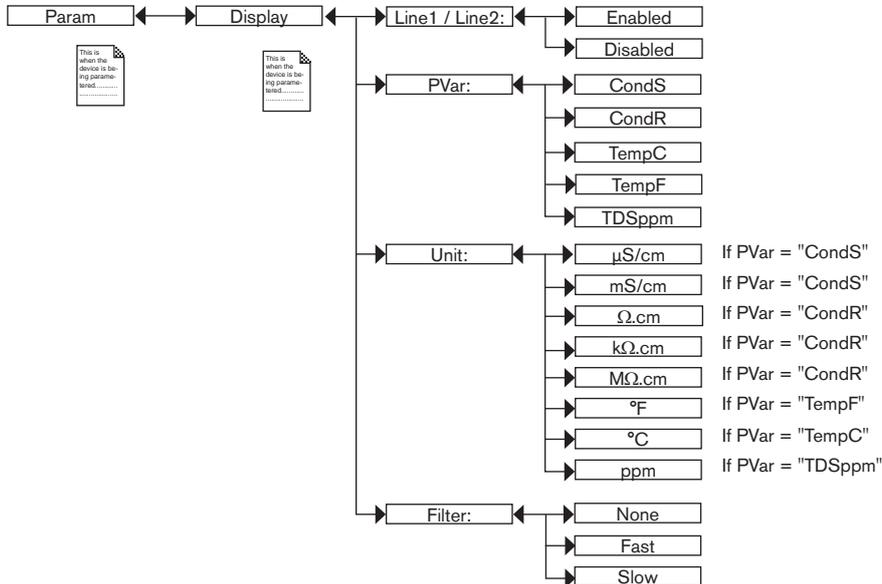


→ Choose “Yes” to restore the default parameters.

→ Choose “No” to keep the current parameters.

9.1.1.5 Setting the data displayed in the Process level

See chpt. 9.9 to access the Parameters menu.



PVAR: choose the process value to be displayed in the line selected.

UNIT: choose the unit for the process value displayed.

FILTER: choose the filter level for the measurement values displayed on the line selected. Three filter levels are proposed: "slow", "fast" or "none".

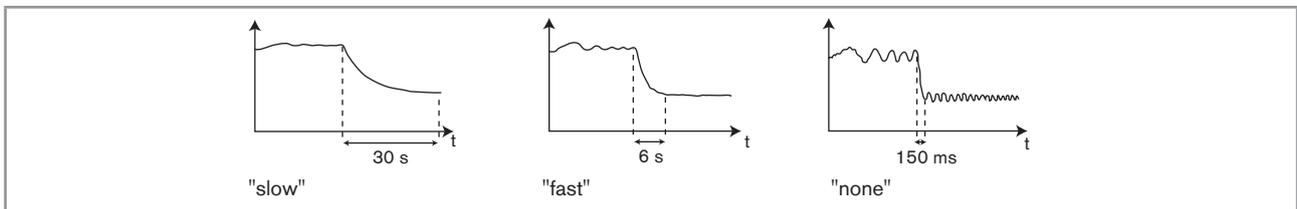
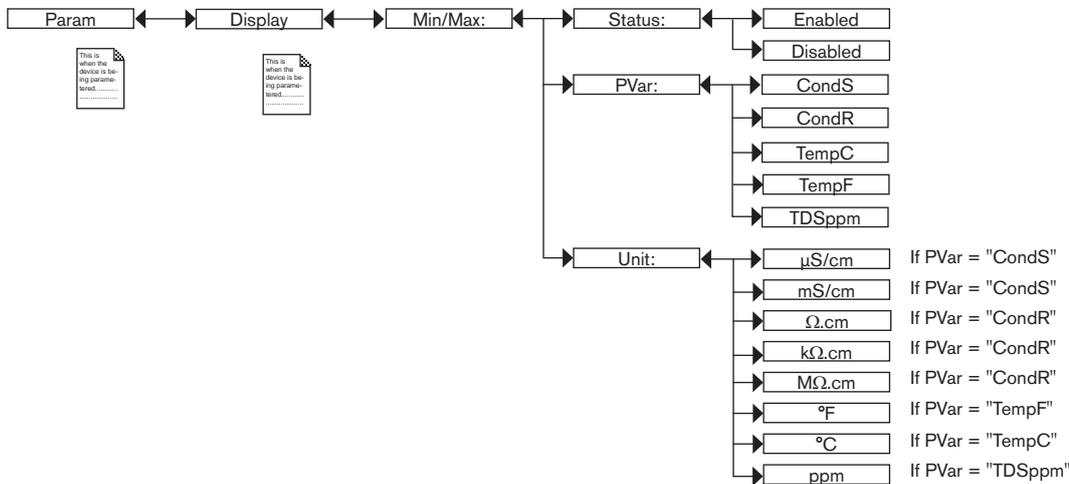


Fig. 31 : Filter curves

9.11.6 Displaying of the lowest and highest values measured

See chpt. 9.9 to access the Parameters menu.



STATUS: choose to display (choice “Enabled”) or not display (choice “Disabled”) the highest and lowest measured values (of the process value chosen in PVAR hereafter) since the latest reset.

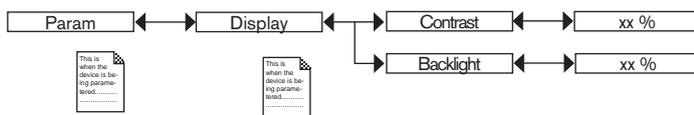
PVAR: choose the process value which highest and lowest measured values are displayed in the Process level.

UNIT: choose the preferred unit in which the lowest and highest measured values are displayed.

9.11.7 Setting the display contrast and brightness

See chpt. 9.9 to access the Parameters menu.

! On a device variant with only one M12 fixed connector and when the power supply is less than 16 V DC, make sure that the light intensity of the display (“Backlight” parameter) is set to a value lower than or equal to 14 %, to not disturb the current outputs.



→ Set each percentage using and .

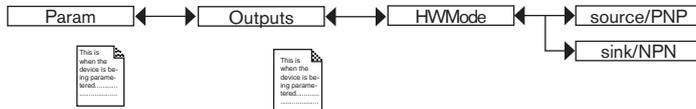
CONTRAST: choose the display contrast level (as a %).

BACKLIGHT: choose the light intensity of the display (as a %).

These settings only affect the display module. They are not factored in during a device data UPLOAD. Refer to chpt. 9.11.1.

9.1.1.8 Choosing the output wiring mode

See chpt. 9.9 to access the Parameters menu.



i The setting has no effect on a device variant with one fixed connector, if the sole current output is wired. Refer to Fig. 18 in chpt. 8.3.3.

The wiring mode is the same for all outputs.

→ If “sink/ NPN” is set, wire the current outputs in sinking mode and the transistor outputs in NPN.

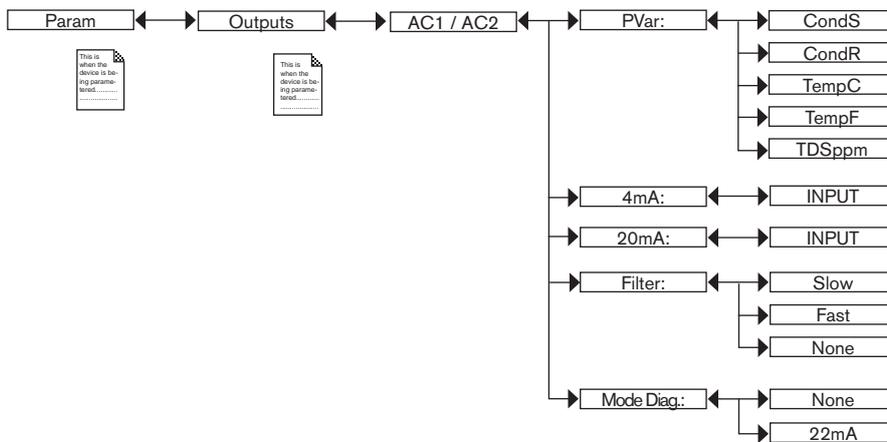
→ If “source/ PNP” is set, wire the current outputs in sourcing mode and the transistor outputs in PNP.

i See chpt. 8.3 Wiring.

9.1.1.9 Setting the parameters of the current outputs

See chpt. 9.9 to access the Parameters menu.

The 2nd current output “AC2” is only available on a device variant with 2 fixed connectors.



PVAR: choose a process value (impedance in Ω .cm, conductivity in S/cm, temperature in $^{\circ}$ C, temperature in $^{\circ}$ F or total dissolved solids in ppm) associated with current output 1 or current output 2 respectively.

Functions “4mA” and “20mA” are used to define the measurement range for the process value associated with the current on the 4...20 mA output.

P_1 and P_2 are the values associated with a current of 4 mA or 20 mA respectively:

If P_1 is higher than P_2 , the signal is inverted and the range P_1-P_2 corresponds to the range for the 20...4 mA current.

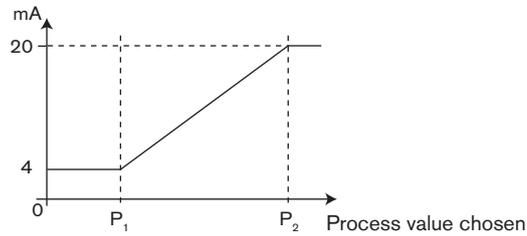


Fig. 32 : 4...20 mA current depending on the process value selected

4mA: choose the value of the process value (previously selected), associated with a current of 4 mA, for each current output.

20mA: choose the value of the process value (previously selected), associated with a current of 20 mA, for each current output.

FILTER: choose the level of damping for the fluctuations of the current value for each current output. Three damping levels are proposed: slow, fast or none. The damping for the current outputs is similar to the damping of the display (see Fig. 31).

MODE DIAG.: choose to emit a current of 22 mA on the current output selected when an "error" event related to diagnostics (see chpt. 9.13.2, 9.13.3 and 9.13.4) is generated by the device or allow the current output to operate normally (choose "none").



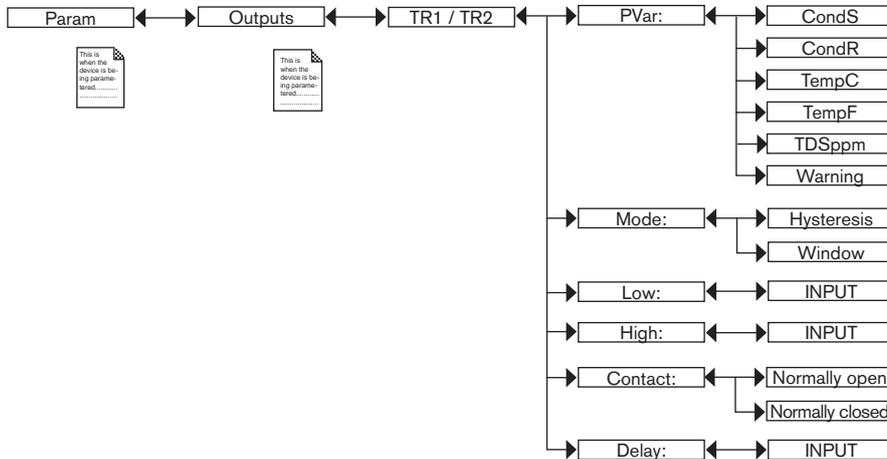
An "error" event linked to a malfunction of the device is always indicated by the generation of a 22 mA current, whatever the adjustment made in the function "MODE DIAG."



See also chpt. [10.3 Solving a problem.](#)

9.11.10 Setting the parameters of the transistor outputs

See chpt. 9.9 to access the Parameters menu.



PVAR: choose a process value (impedance in .cm, conductivity in S/cm, temperature in °C, temperature in °F or total dissolved solids in ppm) associated with transistor output 1 or transistor output 2 respectively or associate the “warning” message (see chpt. 9.12.4, 9.13.2, 9.13.3, 9.13.4 and 9.15.1) with transistor output 1 or transistor output 2 respectively.

If the selected transistor output is linked to the “warning” event, the transistor switches as soon as such an event is generated by the device.



See also chpt. 10.3 Solving a problem.

MODE: choose the operating, hysteresis or window, for transistor output 1 or transistor output 2 (see Fig. 33 and Fig. 34).

LOW: enter the low switching threshold value for transistor output 1 or transistor output 2 (see Fig. 33 and Fig. 34).

HIGH: enter the high switching threshold value for transistor output 1 or transistor output 2 (see Fig. 33 and Fig. 34).

CONTACT: choose the type of off-position (normally open, NO, or normally closed, NC) of transistor output 1 or transistor output 2 (see Fig. 33 and Fig. 34).

DELAY: choose the value of the time delay prior to switching for each transistor output.

Switching only occurs if one of the thresholds, high or low (functions “High” or “Low”), is exceeded for a duration longer than this time delay. The time delay before switching is applicable to both output thresholds.

Hysteresis operating

The change of status is done when a threshold is detected (increasing measured value: threshold high (function High) to be detected; decreasing measured value: threshold low (function Low) to be detected).



Fig. 33 : Hysteresis operating

Window operating

The change of status occurs whenever one of the thresholds is detected.

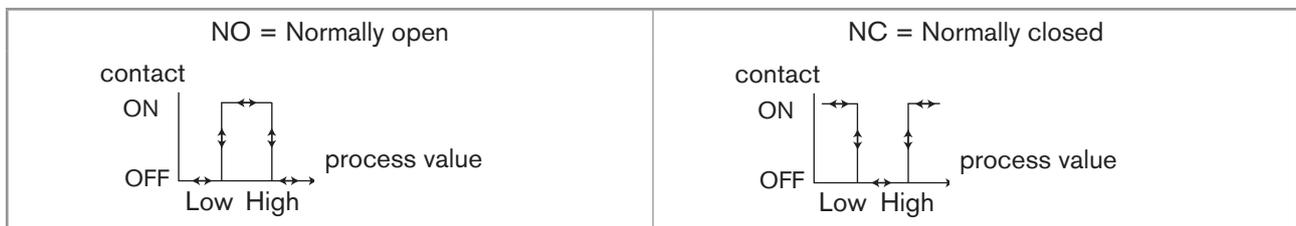


Fig. 34 : Window operating

9.11.11 Choosing the type of temperature compensation

See chpt. 9.9 to access the Parameters menu.

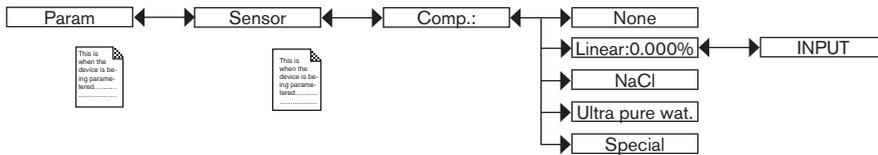
This menu is used to deactivate the temperature compensation (choice "none") or choose the type of temperature compensation to determine the conductivity of the fluid:

- according to a linear percentage (choice "linear") (see details hereafter).
- or according to a predefined graph (NaCl or ultra pure water). The compensation graph "NaCl" is valid for the temperature range +10...+80 °C and a concentration of 0.2 %.
- or according to a graph defined especially for your process (choice "Special") using the "Teach special" function in the "Calibration - Sensor" menu, "Probe" function see chpt. 9.12.4.



If the choice "Special" is set for this function:

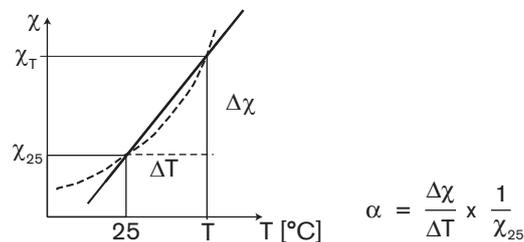
- and the compensation graph has not been determined (see chpt. 9.12.4), the measurements of the conductivity are not compensated in temperature.
- If the compensation graph has been determined (see chpt. 9.12.4), it is not uploaded with the function UPLOAD. Refer to chpt. 9.11.1.



Linear temperature compensation (choice “Linear”)

The linear temperature compensation may be sufficiently precise for your process whenever the temperature of your process is always > 0 °C. Enter a compensation value between 0.00 and 9.99 %/°C.

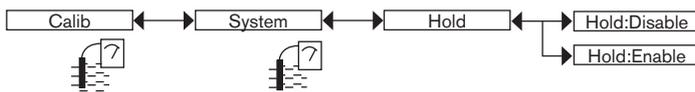
Use the following graph and equation to calculate the average value of the compensation coefficient α according to a temperature range ΔT and the associated conductivity range $\Delta \chi$:



9.12 Knowing the Calibration menu

9.12.1 Activating/deactivating the Hold function

See chpt. 9.9 to access the Calibration menu.



If the mode "Hold" is activated and if there is a power interruption, then, when the device restarts, the mode "Hold" is automatically deactivated.

The mode “Hold” is used to carry out maintenance work without interrupting the process.

To activate the mode HOLD:

- access the “HOLD” function;
- choose “enabled” and confirm by “OK”.

To deactivate the mode HOLD:

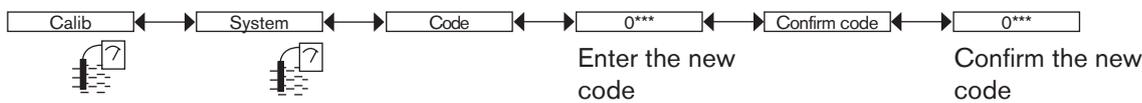
- access the “HOLD” function;
- choose “disabled” and confirm by “OK”.

In practice, when the device is in mode "Hold":

- the  icon is displayed in place of the  icon;
- the current emitted on each 4...20 mA output is fixed at the value of the last measurement of the physical parameter associated with each output;
- each transistor output is fixed at the status acquired at the moment the Hold function is activated;
- the device is in Hold mode until the HOLD function is deactivated.

9.12.2 Modifying the Calibration menu access code

See chpt. 9.9 to access the Calibration menu.



If the default code (0000) is entered, the code will not be requested to access the menu.

9.12.3 Adjusting the current outputs



WARNING

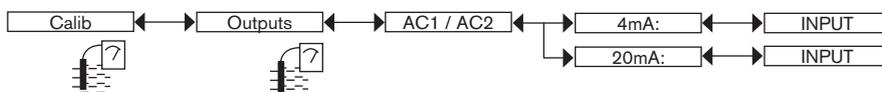
Risk of injury due to wrong adjustment.

- ▶ Make sure that the Hold mode is disabled. Refer to chpt. 9.12.1.



On a device variant with a single M12 fixed connector and if the power supply is lower than 16 V DC, before adjusting the current output, make sure that the light intensity of the display ("Backlight" parameter) is lower than 14 %. Refer to chpt. 9.11.7.

See chpt. 9.9 to access the Calibration menu.



4mA: adjust the current output 1 or current output 2 for 4 mA.

When the "4mA" function is selected, the device generates a current of 4 mA: measure the current emitted by the 4...20 mA output using a multimeter and enter the value given by the multimeter in the function "AC1.4mA" or "AC2.4mA".

20mA: adjust the current output 1 or current output 2. for 20 mA

When the "20mA" function is selected, the device generates a current of 20 mA: measure the current emitted by the 4...20 mA output using a multimeter and enter the value given by the multimeter in the function "AC1.20mA" or "AC2.20mA".

9.12.4 Calibrating the conductivity sensor

DANGER

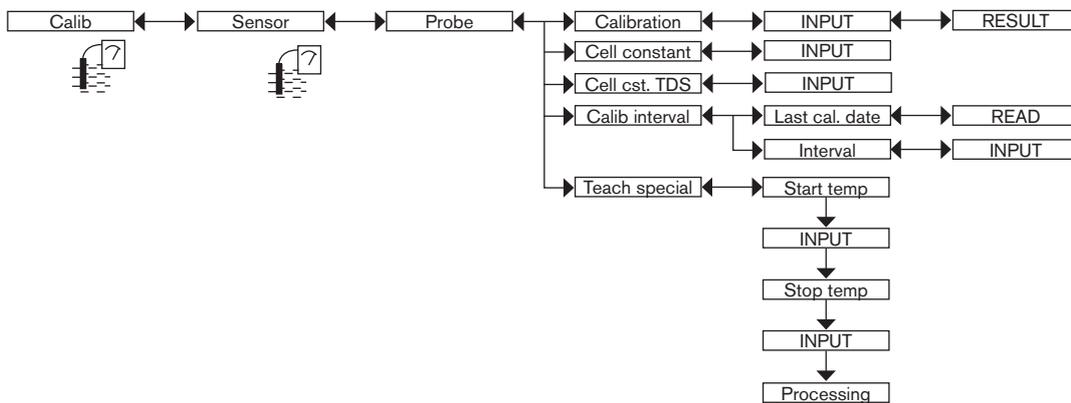
Risk of injury due to electrical voltage.

- ▶ Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to the nature of the fluid.

- ▶ Respect the prevailing regulations on accident prevention and safety relating to the use of dangerous fluids.

See chpt. 9.9 to access the Calibration menu.



→ Calibrate the sensor using one of the following methods:

- **CALIBRATION:** calibrate the conductivity sensor by determining its specific C constant (see details hereafter). This calibration updates the last calibration date ("Last cal. date" function of the CALIB INTERVAL sub-menu).
- **CELL CONSTANT:** enter the cell constant marked on the sensor nameplate or read the last cell constant determined by using the function Calibration above. This input does not update the last calibration date ("Last cal. date" function of the CALIB INTERVAL sub-menu).

CELL CST TDS: enter the TDS factor suited to your process. The TDS factor allows for calculating the amount of Total Dissolved Solids (TDS), in ppm, depending on the measured conductivity. The default TDS factor is 0,46 (NaCl)

CALIB INTERVAL: read the date of the last calibration (function "Last cal. date") and set the periodicity of calibrations, in days (function "Interval"): the device generates a "maintenance" event by displaying the  icon and a "warning" message, each time a calibration is due. Set function "Interval" to "0000 days" to ignore the function.



- The "warning" message may be associated with one or other or both transistor outputs. Refer to chpt. 9.11.10.
- See also chpt. 10.3 Solving a problem.

TEACH SPECIAL: define the temperature compensation graph specific to your process. The graph thus determined and memorised is used by the device when you choose "Special" in the "Comp." function in the menu "Param - Sensor". Refer to chpt. 9.11.11 (see details hereafter).

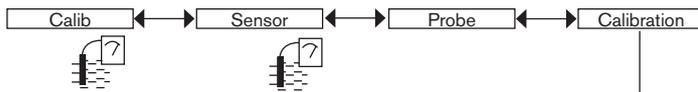


The compensation graph determined with the function TEACH SPECIAL cannot be transferred to another device with the function DOWNLOAD. Refer to chpt. 9.11.1.

Calibrate the conductivity sensor (“Calibration” function in the “Probe” menu)

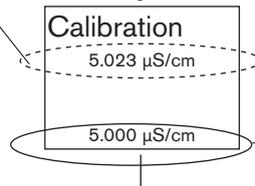
Calibration consists in determining the C constant specific to each conductivity sensor using a solution with a known conductivity.

- ! In order not to interrupt the process, activate the HOLD function. Refer to chpt. 9.12.1.
- Before each calibration, correctly clean the electrodes with a suitable product.
- Set the periodicity of calibrations in the "Interval" function in the sub-menu "Calib interval": each time a calibration is due, the device generates a "maintenance" event and a "warning" message.



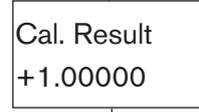
→ Immerse the clean conductivity sensor in the solution with a known conductivity; the device alternately displays:

- the measured temperature of the solution
- the measured conductivity of the solution

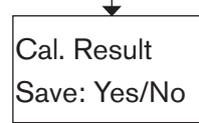


→ Enter the conductivity, at the fluid temperature, of the reference solution used (marked on the bottle or measured using a reference instrument).

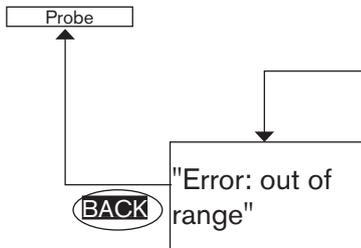
→ Change the unit if necessary.



The device displays the cell constant as calibration result.



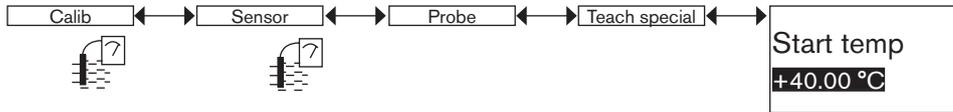
Save or not the calibration result by choosing "Yes" or "No".



The message "Error: out of range" signals that the cell constant is out of the authorized range (< 0.008 or > 12); this may be due to either:

- a mistake made when entering the conductivity, or
- the conductivity sensor, which is not able to measure the solution conductivity.

Define the temperature compensation graph specific to your process ("Teach special" function in the "Probe" menu)



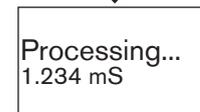
→ Enter the value for the start of the temperature range for which the compensation graph must be determined.



The fluid temperature range (T₋; T₊) must be entered in such a way that the difference between T₋ and T₊ is greater than 8 °C. The message "Error: Temp span at least 8 °C" is displayed if the difference between the range start and end values is less than 8 °C.

→ Enter the value of the end of the temperature range for which the compensation graph must be determined.

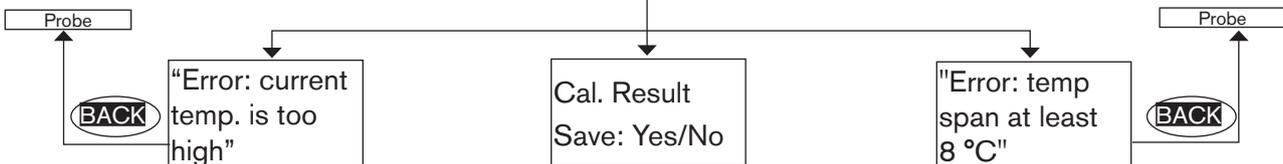
→ Before confirming to begin the procedure, check that the fluid temperature is below 25 °C and T₋.



If the Hold mode is deactivated (chpt. 9.12.1), the device determines the compensation graph with 10 points and displays alternately the measured solution conductivity and the measured solution temperature.



- During measurement, the fluid temperature must pass 25 °C.
- Immerse the sensor in the solution and progressively reheat:
 - from T₋ to T₊ if T₋ < 25 °C < T₊
 - from 25 °C to T₊ if 25 °C < T₋ < T₊
 - from T₋ to 25 °C if T₋ < T₊ < 25 °C
- The rise in temperature must be slow because of the inertia of the temperature sensor.
- Avoid the formation of bubbles on the conductivity sensor.



The message "Error: current temp. is too high" is displayed if, at the beginning of the Teach-In procedure, the fluid temperature is higher than 25 °C or than T₋.

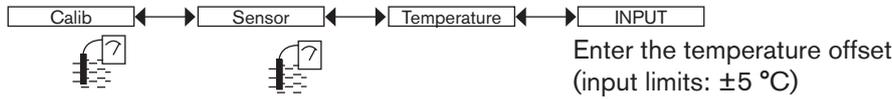
At the end of processing, you are requested to save the calculated graph or not.

The message "Error: Temp span at least 8 °C" is displayed if the difference between the range start and end values is less than 8 °C.

9.12.5 Entering an offset for the temperature measurement

See chpt. 9.9 to access the Calibration menu.

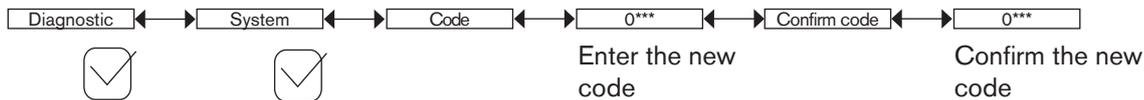
The temperature transmitted by the Pt1000 probe may be corrected. This correction value is the temperature offset.



9.13 Knowing the Diagnostic menu

9.13.1 Modifying the Diagnostic menu access code

See chpt. 9.9 to access the Diagnostic menu.



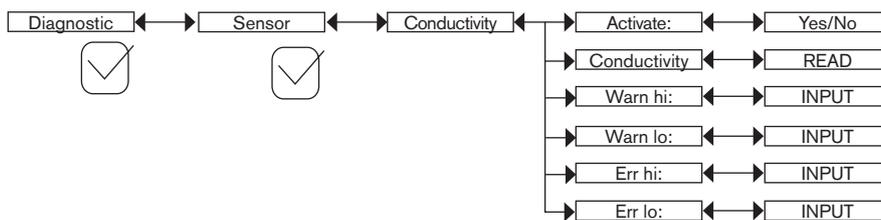
If the default code (0000) is entered, the code will not be requested to access the menu.

9.13.2 Monitoring the fluid conductivity

See chpt. 9.9 to access the Diagnostic menu.

The function allows for monitoring the fluid conductivity and configure the behaviour of the device if the parametered ranges are exceeded.

A malfunction in your process or the conductivity sensor may be indicated either by too low or too high a fluid conductivity or by an incorrect conductivity measurement.



To be warned when the fluid conductivity is too low or too high:

- activate monitoring of the fluid conductivity in the function “activate”, then
- set a conductivity range outside of which the device generates a “warning” event and displays the ☺ and ⚠ icons.
- set a conductivity range outside of which the device generates an “error” event and displays the ☹ and ERR icons.

When the device generates a “warning” or “error” event:

- go into the “Info” menu to read the cause of the event generation.
- and/or go into the “Sensor” function of the Diagnostic menu to read the measured conductivity value.
- if necessary, clean and/or recalibrate the conductivity sensor,
- if necessary, check the process.

- The "warning" event may also be associated with one or other or both transistor outputs. See chpt. [9.11.10](#), function "Output.TR1" or "Output.TR2".
- The "error" event may also be associated with one or other or both current outputs. See chpt. [9.11.9](#), function "Output.AC1" or "Output.AC2".
- See also chpt. [10.3 Solving a problem](#).

ACTIVATE: choose whether or not to activate monitoring of the fluid conductivity.

CONDUCTIVITY: read the fluid conductivity measured in real time.

WARN HI: enter the fluid conductivity value above which a “warning” event is generated.

WARN LO: enter the fluid conductivity value below which a “warning” event is generated.

ERR HI: enter the fluid conductivity value above which an “error” event is generated.

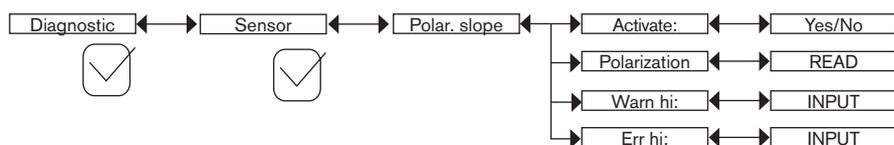
ERR LO: enter the fluid conductivity value below which an “error” event is generated.

9.13.3 Monitoring the polarisation slope

See chpt. [9.9](#) to access the Diagnostic menu.

The function allows for monitoring the polarisation slope and configure the behaviour of the device if the max. thresholds are exceeded.

A malfunction in your process or the conductivity sensor may be shown by too high a polarisation slope.



To be warned when the polarisation slope is too high:

- activate monitoring of the polarisation slope in the function “activate”, then
- set a polarisation slope value above which the device generates a “warning” event and displays the icons ☹️ and ⚠️.
- set a polarisation slope value above which the device generates an “error” event and displays the icons 😞 and ❌.

When a “warning” or “error” event is generated by the device:

- go into the “Info” menu to read the cause of the event generation.
- and/or go into the “Sensor” function of the Diagnostic menu to read the polarisation slope value.
- if necessary, clean and/or recalibrate the conductivity sensor,
- if necessary, check the process.

- The "warning" event may also be associated with one or other or both transistor outputs. See chpt. [9.11.10](#), function "Output.TR1" or "Output.TR2".
- The "error" event may also be associated with one or other or both current outputs. See chpt. [9.11.9](#), function "Output.AC1" or "Output.AC2".
- See also chpt. [10.3 Solving a problem](#).

ACTIVATE: choose whether or not to activate monitoring of the polarisation slope.

POLARIZATION: read the current polarisation slope value.

WARN HI: enter the polarisation slope value above which a “warning” event is generated.

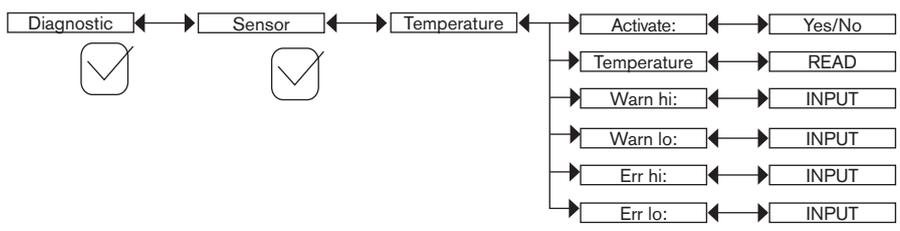
ERR HI: enter the polarisation slope value above which an “error” event is generated.

9.13.4 Monitoring the fluid temperature

See chpt. [9.9](#) to access the Diagnostic menu.

The function allows for monitoring the fluid temperature and configure the behaviour of the device if the parametered ranges are exceeded.

A malfunction in your process or the built-in temperature probe may be shown either by too low or too high a fluid temperature or by an incorrect temperature measurement.



To be warned when the fluid temperature is too low or too high:

- activate monitoring of the fluid temperature in the function “activate”, then
- set a temperature range (in °C) outside of which the device generates a “warning” event and displays the ☹️ and ⚠️ icons.
- set a temperature range (in °C) outside of which the device generates an “error” event and displays the ☹️ and ❌ icons.

When a “warning” or “error” event is generated by the device:

- go into the “Info” menu to read the cause of the event generation.
- and/or go into the “Sensor” function of the Diagnostic menu to read the measured temperature value.
- then check whether the built-in Pt1000 is working correctly by measuring a fluid with a known temperature. If the Pt1000 is faulty, return the device to Bürkert.
- if the Pt1000 is not the cause of the problem, check the process.

- The "warning" event may also be associated with one or other or both transistor outputs. See chpt. [9.11.10](#), function "Output.TR1" or "Output.TR2".
- The "error" event may also be associated with one or other or both current outputs. See chpt. [9.11.9](#), function "Output.AC1" or "Output.AC2".
- See also chpt. [10.3 Solving a problem](#).

ACTIVATE: choose whether or not to activate monitoring of the fluid temperature.

TEMPERATURE: read the fluid temperature measured in real time through the built-in Pt1000.

WARN HI: enter the fluid temperature value above which a “warning” event is generated.

WARN LO: enter the fluid temperature value below which a “warning” event is generated.

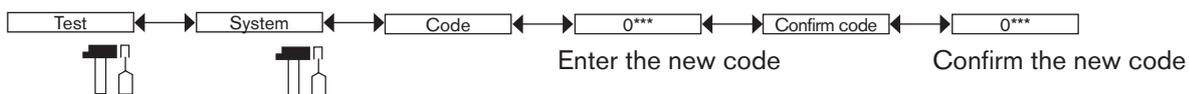
ERR HI: enter the fluid temperature value above which an “error” event is generated.

ERR LO: enter the fluid temperature value below which an „error“ event is generated.

9.14 Knowing the Test menu

9.14.1 Modifying the Test menu access code

See chpt. [9.9](#) to access the Test menu.



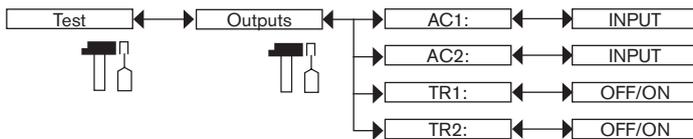
If the default code (0000) is entered, the code will not be requested to access the menu.

9.14.2 Checking the outputs functions

See chpt. 9.9 to access the Test menu.



- Make sure that the “Hold” mode is deactivated. Refer to chpt. 9.12.1.
- The **T** icon is displayed in place of the  icon as soon as the check for the correct working of an output has started. During the check the related output does not react according to the measured physical value.



AC1: check that current output 1 is working correctly by entering a current value and then selecting “OK”.

AC2: check that current output 2 is working correctly by entering a current value and then selecting “OK”.

TR1: check that transistor output 1 is working correctly by selecting the status of the transistor (“ON” or “OFF”) then “OK”.

TR2: check that transistor output 2 is working correctly by selecting the status of the transistor (“ON” or “OFF”) then “OK”.

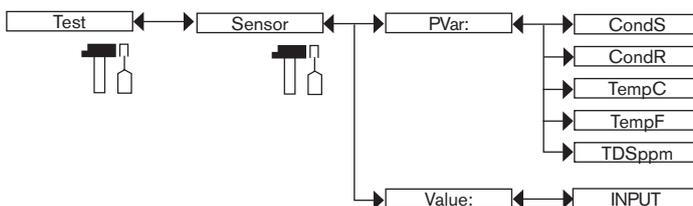
9.14.3 Checking the outputs behaviour

See chpt. 9.9 to access the Test menu.



- Make sure that the “Hold” mode is deactivated. Refer to chpt. 9.12.1.
- The **T** icon is displayed in place of the  icon as soon as the check for the correct working of an output has started. During the check the related output does not react according to the measured physical value.

The feature allows for simulating the measurement of the process value to check if the outputs are correctly configured.



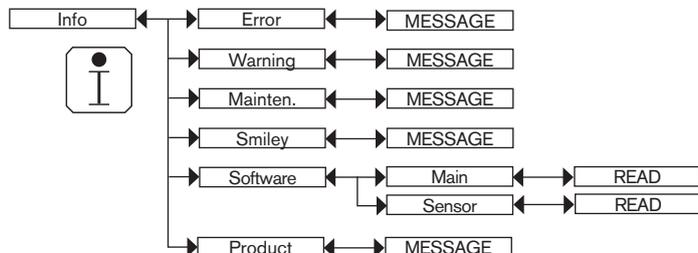
PVAR: choose the process value to be tested.

VALUE: enter a process value selected from the “PVAR” function above to check output behaviour.

9.15 Knowing the Information menu

9.15.1 Reading the cause of events linked to icons

See chpt. 9.9 to access the Info menu.



The function allows for reading a short description of the reason why the following icons are displayed by the device:

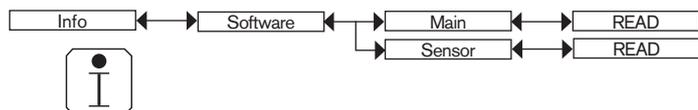
- ERROR:
- WARNING:
- MAINTENANCE:
- SMILEY: or



See also chpt. [10.3 Solving a problem.](#)

9.15.2 Reading the software versions

See chpt. 9.9 to access the Info menu.

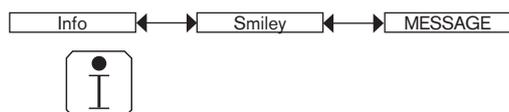


The function allows for reading:

- the software version of the acquisition / conversion board ("Main") for the measurable variables,
- the software version of the sensor ("Sensor").

9.15.3 Reading some identification informations of the device

See chpt. 9.9 to access the Info menu.



The function allows for reading some of the informations that are on the name plate of the device:

- the type of the device,
- the serial number,
- the article number.

10 MAINTENANCE AND TROUBLESHOOTING

10.1 Safety instructions



Risk of injury due to electrical voltage.

- ▶ Before carrying out work on the system or the device, disconnect the electrical power for all the conductors and isolate it.
- ▶ If the device is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- ▶ All equipment connected to the device must be double insulated with respect to the mains according to the standard UL/EN 61010-1.
- ▶ Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to pressure in the installation.

- ▶ Before any intervention in the installation, stop the circulation of fluid, cut off the pressure and drain the pipe.
- ▶ Before any intervention in the installation, make sure that there is no pressure in the pipe.
- ▶ Observe the dependency between the fluid temperature and the fluid pressure.

Risk of burns due to high fluid temperatures.

- ▶ Use safety gloves to handle the device.
- ▶ Before opening the pipe, stop the circulation of fluid and drain the pipe.
- ▶ Before opening the pipe, make sure that the pipe is completely empty.

Risk of injury due to the nature of the fluid.

- ▶ Respect the prevailing regulations on accident prevention and safety relating to the use of dangerous fluids.



WARNING

Risk of injury due to non-conforming maintenance.

- ▶ Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.
- ▶ Ensure that the restart of the installation is controlled after any interventions.

10.2 Cleaning of the device

- 
 ▪ Activate the HOLD function (see chpt. 9.12.1) in the Calibration menu in order not to interrupt the process during cleaning.
- Always use a cleaning product compatible with the materials from which the device is made.
- If magnetic particles are in the fluid to be measured, often clean the deposits on the conductivity sensor, with a special cleaning agent.
- When cleaning the electrodes, ensure that you do not scratch their surface.
- Avoid dry storage of graphite electrodes during long interruptions in measurement in order not to increase the response time when they are next used.

→ Regularly clean the electrodes on the conductivity sensor with a suitable product, depending on how dirty they are.

Please feel free to contact your Bürkert supplier for any additional information.

10.3 Solving a problem

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA	depending on thresholds	ERR + ☹	"Sensor not found"	The connection to the measurement module is interrupted.	→ Switch the power supply off then on again. → if the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☹	"S EE Fact Read"	Factory data is lost.	→ Switch the power supply off then on again. → if the error persists, return the device to Bürkert.
				"S EE Factl Read"	The device continues to measure but with a bad accuracy.	
ON	22 mA	depending on thresholds	ERR + ☹	"S EE User Read"	User data for the sensor is lost.	→ Switch the power supply off then on again. → check the sensor parameters in all the "Sensor" menus then save them again. → if the error persists, return the device to Bürkert.
				"S EE User Write"		

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA	depending on thresholds	 + 	"S PT Missing"	The connection to the Pt1000 probe is lost. The temperature is displayed in the Process level with "+++++°C/°F".	→ Check that the nut between the sensor holder and the electronic module is correctly screwed. → Send the device back to Bürkert
ON	22 mA	depending on thresholds	 + 	"S PT Regulation"	The fluid temperature is not being correctly measured. The process is stopped.	→ Switch the power supply off then on again. → if the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	 + 	"TR EE Fact Read" "TR EE User Read"	Parameter reading error.	→ Switch the power supply off then on again. → if the error persists, set the device back to the default settings (chpt. 9.11.4). → if the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	 + 	"TR COM Measure"	The acquisition/ conversion module of the process values is faulty. The process is stopped.	→ Switch the power supply off then on again. → if the error persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	 + 	"TR EE UserWrite"	Parameter saving error.	→ Switch the power supply off then on again. → Save the settings again. → if the error persists, set the device back to the default settings (chpt. 9.11.4). → if the error persists, return the device to Bürkert.

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
OFF	4...20 mA	depending on thresholds	⚠ + ☹	"S RTC Reinit"	<p>The date and time are lost because the device has not been powered up for at least 5 days.</p> <p>The message is only displayed at the first powering up.</p>	<p>→ Set the date and time again (see chpt. 9.11.2).</p> <p>→ charge the device for at least 4 hours so that the date and time are battery fed for 5 days.</p>
ON	22 mA ¹⁾	depending on thresholds	ERR + ☹	"E:Conductivity"	<p>The fluid conductivity is out of range.</p> <p>The message is displayed if the monitoring of the fluid conductivity has been activated, depending on the set thresholds ERR LO and ERR HI (see chpt. 9.13.2).</p>	<p>→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chpt. 9.13.2).</p> <p>→ If necessary, clean and/or recalibrate the conductivity sensor.</p> <p>→ If necessary, check the process.</p>
ON	22 mA ¹⁾	depending on thresholds	ERR + ☹	"E:Polarization"	<p>The polarisation slope is too high.</p> <p>The message is displayed if the monitoring of the polarisation slope has been activated, depending on the set threshold ERR HI (see chpt. 9.13.3).</p>	<p>→ Go into the "Sensor" function of the Diagnostic menu to read the polarisation slope value (chpt. 9.13.3),</p> <p>→ If necessary, clean and/or recalibrate the conductivity sensor.</p>

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA ¹⁾	depending on thresholds	 + 	"E:Temperature"	<p>The fluid temperature is out of range.</p> <p>The message is displayed if the monitoring of the fluid temperature has been activated, depending on the set thresholds ERR LO and ERR HI (see chpt. 9.13.4).</p>	<p>→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chpt. 9.13.4).</p> <p>→ If necessary, check whether the built-in Pt1000 is working correctly by measuring a fluid with a known temperature,</p> <p>→ If the Pt1000 is faulty, return the device to Bürkert,</p> <p>→ If the Pt1000 is not the cause of the problem, check the process.</p>

¹⁾ if the MODE DIAG function of the "Output.AC1" or "Output.AC2" menu is set to "22 mA" (see chpt. [9.11.9](#)); else, the current output delivers a standard current between 4 and 20 mA

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
OFF	4...20 mA	Switched ²⁾	△ + ☺	"W:Conductivity"	<p>The fluid conductivity is out of range.</p> <p>The message is displayed if the monitoring of the fluid conductivity has been activated, depending on the set thresholds WARN LO and WARN HI (see chpt. 9.13.2).</p>	<p>→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chpt. 9.13.2).</p> <p>→ If necessary, clean and/or recalibrate the conductivity sensor.</p> <p>→ If necessary, check the process.</p>
OFF	4...20 mA	Switched ²⁾	△ + ☺	"W:Polarization"	<p>The polarisation slope is too high.</p> <p>The message is displayed if the monitoring of the polarisation slope has been activated, depending on the set threshold WARN HI (see chpt. 9.13.3).</p>	<p>→ Go into the "Sensor" function of the Diagnostic menu to read the polarisation slope value (chpt. 9.13.3),</p> <p>→ If necessary, clean and/or recalibrate the conductivity sensor.</p>
OFF	4...20 mA	Switched ²⁾	△ + ☺	"W:Temperature"	<p>The fluid temperature is out of range.</p> <p>The message is displayed if the monitoring of the fluid temperature has been activated, depending on the set thresholds WARN LO and WARN HI (see chpt. 9.13.4).</p>	<p>→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chpt. 9.13.4),</p> <p>→ if necessary, check whether the built-in Pt1000 is working correctly by measuring a fluid with a known temperature.</p> <p>→ If the Pt1000 is faulty, return the device to Bürkert.</p> <p>→ if the Pt1000 is not the cause of the problem, check the process.</p>
OFF	4...20 mA	Switched ²⁾	📅	"M:Calib. Date"	<p>A calibration of the conductivity sensor is due.</p> <p>The periodicity of the calibrations is set within the "INTERVAL" function of the "CALIB INTERVAL" menu (see chpt. 9.12.4).</p>	<p>→ Calibrate the conductivity sensor (chpt. 9.12.4).</p>

²⁾ If the "PVAR" function of the "Output.TR1" and/or "Output.TR2" menus is set to "warning" (see chpt. 9.11.10); else, the transistor outputs are operating depending on the set thresholds.

11 ACCESSORIES



ATTENTION

Risk of injury and/or damage caused by the use of unsuitable parts.

Incorrect accessories may cause injuries and damage the device and the surrounding area.

► Use only original accessories and original replacement parts from Bürkert.

Accessory	Article number
Display module	559168
Set with 2 opaque housing-lids, with seals: - 1 screw housing-lid with 1 EPDM seal - 1 quarter turn closing housing-lid with 1 silicone seal	560948
Set with 2 transparent housing-lids, with seals: - 1 screw housing-lid with 1 EPDM seal - 1 quarter turn closing housing-lid with 1 silicone seal	561843
Calibration solution, 300 ml, 5 µS	440015
Calibration solution, 300 ml, 15 µS	440016
Calibration solution, 300 ml, 100 µS	440017
Calibration solution, 300 ml, 706 µS	440018
Calibration solution, 300 ml, 1413 µS	440019
5-pin female M12 connector, to be wired	917116
5-pin female M12 female connector, moulded on shielded cable (2 m)	438680
5-pin male M12 connector, to be wired	560946
5-pin male M12 connector, moulded on shielded cable (2 m)	559177

12 PACKAGING, TRANSPORT

NOTICE

Damage due to transport

Transport may damage an insufficiently protected device.

- ▶ Transport the device in shock-resistant packaging and away from humidity and dirt.
- ▶ Do not expose the device to temperatures that may exceed the admissible storage temperature range.
- ▶ Protect the electrical interfaces using protective plugs.

13 STORAGE

NOTICE

Poor storage can damage the device.

- ▶ Store the device in a dry place away from dust.
- ▶ Storage temperature of the device: $-10...+60$ °C.

14 DISPOSAL OF THE DEVICE

→ Dispose of the device and its packaging in an environmentally-friendly way.

NOTICE

Damage to the environment caused by parts contaminated by fluids.

- ▶ Comply with the national and/or local regulations which concern the area of waste disposal.

